



AGRICULTURAL RESEARCH INSTITUTE
PUSA

TRANSACTIONS
OF
THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND

WITH

AN ABSTRACT OF THE PROCEEDINGS AT BOARD AND GENERAL
MEETINGS, AND THE PREMIUMS OFFERED BY
THE SOCIETY IN 1901

PUBLISHED ANNUALLY



FIFTH SERIES

VOL. XVI.

EDITED BY JAMES MACDONALD, F.R.S.E., SECRETARY TO THE SOCIETY

WILLIAM BLACKWOOD & CO., LTD., PRINTERS, 10, N. B. STREET, GLASGOW.
1901

WORKS ON AGRICULTURE, &c.

- - -

JOURNAL OF AGRICULTURE, AND TRANSACTIONS OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

Second Series, 1828 to 1843, 21 vols.—*out of print*.

Third Series, 1843 to 1865, 22 vols.—*out of print*.

INDEX TO THE FIRST, SECOND, AND THIRD SERIES OF THE TRANSACTIONS OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND FROM 1799 TO 1865. Cloth, 5s.

TRANSACTIONS OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND. Fourth Series, 1866-71, 6 numbers, sewed, 4s. each; 1872-88, 17 volumes, cloth, 5s. each.

INDEX TO THE FOURTH SERIES OF THE SOCIETY'S TRANS- ACTIONS FROM 1866 TO 1888, bound in cloth, 3s.

TRANSACTIONS OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND. Fifth Series, 1889-1904, 16 volumes, bound in cloth, 5s. each.

INDEX TO THE FIFTH SERIES OF THE SOCIETY'S TRANS- ACTIONS.

From 1889 to 1895, paper cover, 1s.

From 1896 to 1902, paper cover, 1s.

REPORT ON THE PRESENT STATE OF THE AGRICULTURE OF SCOTLAND, ARRANGED UNDER THE AUSPICES OF THE HIGHLAND AND AGRICULTURAL SOCIETY. Presented at the International Agricultural Congress at Paris in June 1878. Cloth, 5s. *Free to Members on application to the Secretary.*

DICTIONARIUM SCOTO-CELTICUM: A DICTIONARY OF THE GAELIC LANGUAGE, in two volumes. Compiled and published under the direc- tion of the Highland Society of Scotland, 1828. Bound in cloth, 47, 7s.; 6 copies on extra paper, £10, 10s.

PRACTICAL REMARKS ON AGRICULTURAL DRAINAGE. By WILLIAM W. HOZIER of Tannochside. Prize Report, published under the auspices of the Society, 1870. Cloth, 1s.

HUMANITY TO ANIMALS, BEING EXTRACTS FROM PRIZE ESSAYS ON THE MOST EFFECTUAL METHOD OF INCUKGATING THAT DUTY IN ELEMENTARY SCHOOLS. Published under the auspices of the Society. Sewed, 8d.

HISTORY OF THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND, WITH NOTICES OF ANTERIOR SOCIETIES FOR THE PROMOTION OF AGRICULTURE IN SCOTLAND. By ALEXANDER RAMSAY. Demy 8vo, cloth, 16s.

THE PINE BEETLE (*HYLESINUS PINIPERDA* L.) By W. SOMERVILLE, D.Sc., B.Sc. Prize Report. Sewed, 3d.

*The above Works can be had on application to WILLIAM BLACKWOOD & SONS,
45 George Street, Edinburgh, and 37 Paternoster Row, London.*

CONTENTS

	PAGE
1. THE HAY-COLLECTOR. By JOHN SPEIR. (<i>Illustrated</i>)	1
2. THE PRACTICE OF HEATHER-BURNING. By JAMES CAMERON	10
3. RURAL DEPOPULATION IN SCOTLAND. By JOHN W. PATERSON, B.Sc., Ph.D.	21
4. FERTILITY IN SHEEP. By FRANCIS H. A. MARSHALL, B.A., F.R.S.E.	34
5. THE INFLUENCE OF FOOD ON MILK. By ALLAN BARNES GRAHAM, Jun.	43
6. POULTRY-KEEPING FOR FARMERS. By ALEX. M. PRIN. (<i>Illustrated</i>)	62
7. ON ANTHRAX. By Professor JOHN DUNSTAN, M.R.C.V.S., F.R.S.E.	75
8. METHODS OF FARMING IN PERTH SHOW DISTRICT. By A. S. GRANT	92
9. THE SHEEP MAGGOT-FLY. Preliminary Report. By Professor R. STEWART MACDOUGALL	128
10. REVIEW OF AGRICULTURAL EXPERIMENTS. By Dr A. P. AITKEN	143
11. MILK RECORDS. By JOHN SPEIR. (<i>Illustrated</i>)	170
12. THE MULTIPLE ORIGIN OF HORSES AND PONIES. By J. COSSAR EWART, M.D., F.R.S. (<i>Illustrated</i>)	230
13. MILK INVESTIGATIONS AT GARTFORTH, 1903. By CHARLES CROWTHER, M.A. (Oxon.), Ph.D.	265
14. THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1903, AND METEOROLOGY OF THE YEAR RELATIVE THERETO—	
The Crops	326
The Meteorology. By Dr ALEXANDER BUCHAN	350
15. AGRICULTURAL STATISTICS	361
16. PRICES OF GRAIN IN EDINBURGH MARKET FOR 1903	374
17. PRICES OF SHEEP SINCE 1818	381

18. PRICES OF WOOL SINCE 1818	363
19. GENERAL SHOW AT DUMFRIES, 1903. (<i>Illustrated</i>)	385
20. PREMIUMS AWARDED BY THE SOCIETY IN 1903	405
21. ACCOUNTS OF THE SOCIETY FOR 1903	437
22. PROCEEDINGS AT THE SOCIETY'S BOARD AND GENERAL MEETINGS	445

APPENDIX A.

ROYAL CHARTERS GRANTED TO THE HIGHLAND AND AGRICULTURAL SOCIETY.	1
--	---

APPENDIX B.

PREMIUMS OFFERED BY THE SOCIETY IN 1904	1
MEMBERS ADMITTED IN JUNE 1903 AND JANUARY 1904	81

--

INDEX	i
-----------------	---

* * It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the Writers whose Papers are published in the 'Transactions.'

ILLUSTRATIONS

FIG.	PAGE	FIG.	PAGE
1. Self-loading hay-collector	3	25. Sketch of a horse with a small head and a straight profile, above which is the head of a Roman-nosed long-headed animal	236
2. Collector ready for transport	4	26. A row of large heavy-headed horses engraved on a piece of reindeer-horn	237
3. The machine approaching the ricks with a load, as seen from behind	5	27. Engraving of a small-headed horse on a piece of reindeer-horn	238
4. The machine approaching the ricks with a load, as seen from the front	6	28. Engraving showing horses which might perhaps be described as forming part of the front rank of a squadron	239
5. Horses backing the machine from under the load	7	29. A young wild horse belonging to the Duke of Bedford	244
6. Minorcas	64	30. The head of a two-year-old wild horse	245
7. White Leghorns	65	31. The tail of an adult wild horse, showing the short hair carried by the upper two-thirds of the dock and the long hair of the distal third	246
8. Dorkings	65	32, 33. Professor Ewart's yearling wild horse in summer coat	247
9. Indian Game	66	34. A typical Celtic pony in winter coat	249
10. Orpington	66	35. Head of Celtic pony represented in fig. 34, showing heavy mane and forelock, full eye, fine arched muzzle, wide nostril, and well-moulded under lip	250
11. Plymouth Rocks	67		
12. Movable house	69		
13. Movable poultry-house (sloping)	69		
14. Incubator	71		
15. Testing an egg	72		
16. Fertile egg, 2nd to 19th day	72		
17. Sorting-board	73		
18. Ayrshire Cow, "Lily of Shawmuir"	228		
19. Ayrshire Cow, "Rosie III." 11,356	228		
20. Ayrshire Cow	229		
21. Horse with a long head	234		
22. Horse with a small head	234		
23. Engraving of a heavily built horse	235		
24. Head of a horse with a profile like that of an Arab	235		

FIG.	PAGE.	FIG.	PAGE.
36. Celtic pony, to show tail-lock in midwinter	251	52. Shorthorn Bull, "Royal Archer" 82,127	393
37. Celtic pony, to show dorsal band and tail-lock towards end of winter	252	53. Aberdeen-Angus Bull, "Marionmere" 18,160	393
38. Celtic pony in midsummer with the mane removed	253	54. Galloway Cow, "Lady Harden 2nd of Durhambill" 11,351	394
39. A member of the all but extinct old Hebridean race of ponies	256	55. Highland Bull, "King Alaric" 1712	394
40. Head of a nine-months Faroe colt with a tan muzzle, a light-coloured lower eyelid, a depression below the level of the eyes, and a "flat nose"	257	56. Ayrshire Cow, "Blood 2nd" 12,797	395
41. A member of the white-maned Uist race of horses	258	57. Clydesdale Stallion, "Everlasting" 11,331	395
42. A Palaeolithic drawing showing a man, a snake (?), and a horse with a square-shaped muzzle resembling that of the flat-nosed variety (fig. 39) of the Celtic pony	260	58. Draught Gelding, "Conqueror"	396
43. A richly striped dark yellow-dun horse of the Norse type, which has a general resemblance to the Combarelles horse reproduced in fig. 23	262	59. Clydesdale Mare, "Celtic Princess"	396
44. Face of a yellow-dun Norse pony showing zebra-like markings	264	60. Hunter Mare, "Blitz"	397
45. "Atholl," a three-year-old 15-hands garron, belonging to the Congested Districts Board for Scotland	266	61. Hackney Stallion, "St John" 8290	397
46-51. Show the variation of yield and fat in each cow	280, 281, 285, 286, 291, 292	62. Pony Stallion, "Tom Gordon"	398
		63. Highland Pony Stallion, "Moss Crook" 256	398
		64. Gelding, "Patronus" 7215, in harness	399
		65. Shetland Pony Mare, "Beatrice" 1533	400
		66. Blackfaced Shearling Ewe	400
		67. Cheviot Shearling Tup	401
		68. Border Leicester Shearling Tup	401
		69. Half-bred Ewe	402
		70. Shropshire Tup	402
		71. Oxford Down Shearling Tup	403
		72. Suffolk Ewe	403
		73. Large White Sow, "Colston Lass" 11,216	404

TRANSACTIONS
OF
THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND

THE HAY-COLLECTOR.

By JOHN SPEIR, Newton Farm, Glasgow.

Historical.

OWING to the increase of cartage work which annually occurs on this farm at, or immediately after, hay-making, the stacking of the hay crop was often, prior to 1886, difficult to accomplish before harvest began. In the spring of that year the idea occurred to me of combining the use of the rick-lifter and the horse-fork. The former had been in limited use on a few upland farms on the borders of Ayrshire and Lanarkshire, and the latter was in general use in the hay-barns of America, and to a very limited extent in South Wales. Two rick-lifters and a horse-fork were ordered in plenty of time, and on trial the combination turned out so successful that a second set was ordered by a neighbour for use that same season. The combination of these two machines has been of immense advantage to farmers growing large areas of hay, and instead of the rick-lifter being confined to moorland districts, it and the horse-fork are now found on almost every farm in the west where hay is grown for home consumption or for sale to any considerable extent.

After the first season's trial I wrote a series of articles in the autumn of 1886 to the 'North British Agriculturist' showing the value of these machines, describing them in detail, and

explaining the method of working them. At that time, and later on, I repeatedly expressed the opinion that if we had a satisfactory machine for collecting loose hay, or which could bring hay in coils to the forkers at the field ricks, our method of making hay would be very much simplified and the cost considerably reduced. Collectors of various kinds had been more or less in use for years, but at the time the above was written none of them were sufficiently satisfactory, in my opinion, to warrant their purchase. Shortly after that, I received information of one which had recently been introduced in America, and after an examination of illustrations of it, I decided to give it a trial.

Early American Collectors.

In the summer of 1889 I received from the Acme Harvesting Co. of Pioria, Ill., U.S.A., what they called a sweep-rake. In principle and pattern it was to all intents and purposes the same as the collector herein illustrated, although differing in many minor details. It was somewhere about 15 feet wide, with wheels at the sides instead of under the body of the machine, as in the present pattern. It was first used in the autumn of 1889 for collecting the second crop of Italian ryegrass. For soft hay, like second cut, or ordinary meadow-hay, it was found that the points were too blunt to go well under the hay, but in hard dry hay like clover or timothy hay they worked quite well. The machine worked fairly satisfactorily when once it was inside the field, but the difficulty was to get it there. It was cumbrous to move along any ordinary road, and no gate on the farm would admit it. It had to be lifted bodily over the gate-posts. This was a difficulty I had not anticipated before purchase, and proved an insuperable one to successful working. In consequence it was little used, and only when two or more fields were close together, so that the difficulties of transportation from one field to another were reduced to a minimum.

Introduction into England.

In December 1889 Mr Primrose M'Connell, Ongar Park, Essex, wrote to me that he intended sending to America for two of these hay-collectors, and asked particulars as to price, carriage, and other points. I told him the difficulties I had with regard to transference from one field to another, and said he might have my one, if he liked, at cost price in America. He accepted it on these terms, and after having some experience of it, had another made locally. About this time the original makers in America introduced an alteration in the design, which permitted of the tines or teeth being set up on

end when passing through a gate, or from one field to another. This alteration was at once adopted by Mr M'Connell, and was found to be a great improvement, and from that day forward the demand for the machine rapidly increased among his neighbours. Up to the present somewhere between two and three hundred have been made in England, principally in Essex and the southern counties. I saw the machine working in the south on several occasions, when it did very satisfactory work, but it still seemed to me too wide and unwieldy for general use on the average farm.

Its Use in Scotland.

I was, however, so satisfied of the value and usefulness of the machine for our system of making hay in Scotland, that two years ago I ordered one to be made 3 feet narrower than the English pattern. The photographs accompanying this article are of that machine (fig. 1). It has been in use here for two

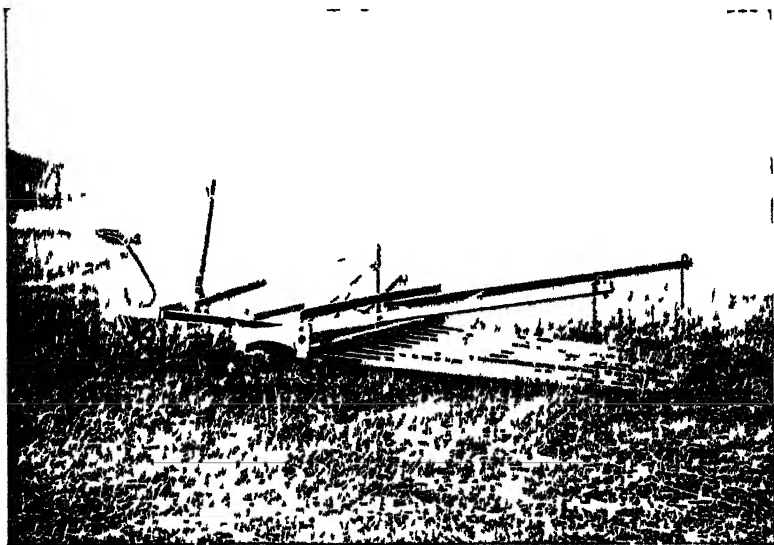


Fig 1 - Self loading hay collector

seasons, during which it has been employed for collecting hay crop and the second cut. This is equivalent to four seasons' work, and the results have been most satisfactory. During the past season seven or eight others were in use, most of which have given entire satisfaction. At first it is a little awkward to work, both for the driver and the horses, but a few hours' experience acquaints both with its peculiarities, after which it

becomes as easily handled as a mower or binder. Until the man becomes accustomed to it, a pair of pliable, steady horses should be employed, but later on any ordinary pair of horses may be used.

Moving from Field to Field.

In moving the machine from the farm-stead to the field, or from one field to another, the two wheels under the frame are withdrawn from their sockets and inserted in others at right angles to the first (fig. 2). One of these wheels is arranged on

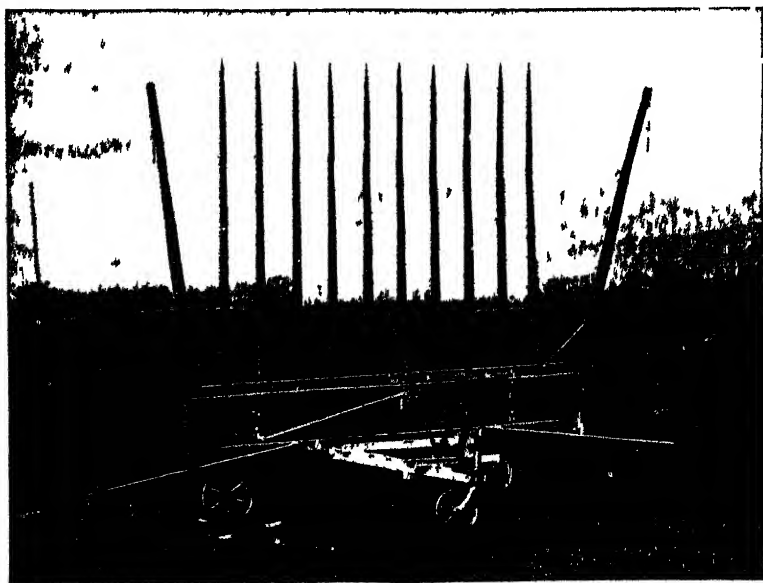


Fig 2 —Collector ready for transport

a swivel, and the machine is drawn along the road from the side on which the swivel-wheel is placed. As soon as the position of the wheels has been altered, the machine may be set up on edge, and secured in that position by a simple arrangement for the purpose. The draught-bar to which the horses are attached, and which almost touches the ground behind, should be raised to prevent its being damaged on uneven roads. This is done by withdrawing one bolt and tying up the bar. The machine is now ready to be moved by yoking a horse to the bar opposite to the one which was loosened, and as so arranged it will pass through any ordinary gateway.

THE HAY-COLLECTOR

The Position of the Ricks.

In the field the line of ricks should be arranged so that the hay can be brought in from both sides with not more than two fills of the machine (fig. 3). The line of ricks should therefore run across the line of coils or rows of hay, if it is spread out. If the hay has not been coiled, it is quite as easily lifted out of the swathe as in any other way, and the machine will work just as well across the swathes as along them. If the crop is light, time will be saved by gathering it into rows by the horse-rake, the row or rows of ricks to run across these. So arranged, the hay will be brought to the ricks with half the travelling on



Fig. 3.—*The machine approaching the ricks with a load, as seen from behind.*

the part of the collector that will be necessary if it has to be brought a greater distance, while the speed with which it will be brought in is very much greater.

Loading the Machine.

If the distance is short, most speed will be made by bringing in, comparatively speaking, small loads; but if the crop is thin, and the distance the collector has to travel over is consequently greater, the machine should be filled to its greatest capacity. This will be best accomplished by first loading the collector till the tines begin to slip over the crop, then backing the machine a foot or so. When moved forward again, the tines go easily

in below the hay, and a very much larger load can be taken than is possible without stopping and backing, so that the time taken up doing this is not lost. The collector should always go to the farthest away point from the ricks before beginning to load, and in doing so the tines should be raised off the ground by the hand-lever, and not put down till the machine is turned round and in a position to move straight to the ricks (fig. 4). The machine is then turned when empty instead of full, which saves considerable time, and is much easier for the horses. When the collector is full no attempt should be made to lift the points of the tines off the ground by the hand-lever: they should be al-



Fig. 4 — *The machine approaching the ricks with a load, as seen from the front.*

lowed to slip along the ground till the rick is reached. At the rick the load should be deposited where it will be most convenient for the forker.

Unloading the Machine.

When the load has been driven forward to the rick both horses should be steadily backed at the same time, when the tines will easily slip out from under the load, leaving it ready for the forker (fig. 5). As soon as the tines are free from the load, the points should be raised so as to clear them of loose hay, and to prevent them catching the ground when turning. If at any time the points of the tines catch the ground, either from the unevenness of the surface or from furrows, the machine

THE HAY-COLLECTOR.

should be backed, otherwise any side movement may break the tines.

In going from the ricks to reload, any loose hay which has been missed can be gathered without any loss of time by dropping the points of the collector and allowing it to slip up the



Fig. 5 —Horses backing the machine from under the load.

tines as the horses travel out. This reduces the quantity of rakings, and can be done with little effort on the part of the driver, and almost none on that of the horses.

The Quantity of Hay the Collector can bring in.

In a crop of from 25 to 30 cwt. per acre, already raked into rows, in coils unbroken, turned over or shaken out, one collector will bring in sufficient hay to keep from two to three men forking. In a crop of 2 to 3 tons per acre one collector will keep from three to four ricks going. Each district has its own way of building ricks and collecting the hay, but in none that I am acquainted with can one man gather so much hay with the same ease as can be done by this collector. Where hay-sledges are used for bringing in the hay to the rickers, one man or two women can usually put as much hay on the sledge, if lifting it out of the coil, as will keep one rick going. If, however, the hay is in the swathe, has been gathered into rows by the rake, or has been shaken out of the coil, double the number stated above will be necessary to bring in the same quantity of hay. With this collector one man brings in the hay as easily from spread-out coils as from whole ones, and about as much of it.

Advantages of the Machine.

To make first-class hay in Scotland, in almost any weather, good or bad, the half-made hay should be coiled as soon as possible. It often happens, either from insufficient exposure to the sun before coiling, from having stood too short a time in the coil, or from rain having fallen after coiling, that it is desirable to turn up the coils, or shake them out for a limited time before ricking. Owing, however, to the risks run in shaking out three-quarter-made hay, and the difficulty of gathering it up afterwards, compared with lifting it from coils, everybody hesitates to shake it out of the coil, even in settled weather, and when unsettled it should not be done. The consequence is that much hay is often ricked in a very indifferent condition, or is probably not ricked at all, and a good opportunity missed, while with the assistance of a collector the hay could have been shaken out with little risk, and re-collected without much trouble. This alone is an immense advantage, the benefit of which any one with a large or small quantity of hay to handle can easily appreciate.

The Machine leaves little Rakings.

The amount of rakings after the hay-collector is less than by any other system of gathering known to me. Rakings, to be properly utilised, should be regularly gathered in small quantities, and uniformly mixed with the bulk of the crop. Either on a large or small scale, this is always a difficult matter, as most people fret at the time it takes to gather them up. The delay caused by bringing them in often leaves the forkers short of hay, and causes loss of time, which can ill be afforded at such a busy season. With the hay-collector this is avoided. If, as should be the case, the land is being horse-raked as it is cleared of hay, all that is necessary to do in order to gather the rakings is for the collector to go to the far-away end of a row, when the rakings can be loaded as speedily and as cleanly as the ordinary crop. In this manner no delay occurs through the irregularity of the supply of hay to those building the ricks, and the work consequently goes on, not only speedily, but satisfactorily.

Removing to another Field.

When the work in one field is finished, and the collector requires to be taken home or removed to another field, the wheels under the machine are withdrawn and replaced in their new position. The tines are now raised to the perpendicular, when the machine is ready to go anywhere. Two men can do this in two or three minutes.

Yoking the Machine.

In yoking the machine the same harness is necessary as would be used for a mower, and in addition a light cord should be provided to tie the horses between the heads. Owing to its length, a light cord is very much better for this purpose than rope of ordinary plough-rein size. The weight of the latter causes it to hang down between the horses to such an extent as to be troublesome, while a light cord causes less inconvenience in that way.

How the Collector is used in England.

With the lighter crops, drier climate, and greater sunshine of the midland and southern counties of England, the method of hay-making is altogether different from that generally followed in Scotland. In the south the hay can be sufficiently dried on the ground, or in the wind-row, to be carried direct to the stack, whereas in Scotland such could be done with advantage only once in many years. Under such circumstances the hay is generally stacked in the field at any point convenient for removal. In such cases the collector usually gathers the hay from the row after the crop has been gathered together by the horse-rake. By the collector it is conveyed direct to the stack, to the top of which it is generally raised by an elevator or horse-fork.

In ordinary circumstances it is not possible to adopt this method in Scotland; but in a specially dry year, with settled weather, and more especially in the eastern counties, it might occasionally be followed with advantage. Hay so made requires very little manual labour, and consequently is made at very little cost.

Storing the Machine.

All farm machinery should be kept under cover when not in use, and as this machine is composed principally of wood, it is more necessary to thoroughly protect it than most others. In its working state it takes up a lot of space, which on most farms is not too plentiful for the storage of machines. Like many other farm implements, this machine is, however, only in use for two or three weeks each season, and therefore more care should be devoted to storing it.

The triangular part behind the machine, on which the driver's seat is placed, is connected to the body of the machine only by two split-pin hinges and the rod connected with the lever for raising the tines. These are easily disconnected, when the tines may be placed on end against the wall in any shed or other

building, where they will occupy very little space. Owing, however, to the length of the tines, many farms may not have a building high enough to permit of them being put on end, in which case the machine may be hung up to the joists or against the roof. Failing suitable accommodation for it otherwise, the tines can all be taken off in a few minutes, as each is only held on by two bolts. When removed, they may be put past singly on the joist of any out-building, or in any other convenient position under cover.

THE PRACTICE OF HEATHER-BURNING.

By JAMES CAMERON, 'Dundee Advertiser' Office, Dundee.

THE oldest man in the ranks of Scottish upland graziers does not remember of a time when heather-burning was practised without leaving a sense of wrong on the part of proprietor or tenant. Highland *sgeuls* and a few Lowland traditions take one beyond the single link of direct personal experience, and preserve, with a due fringe of adornment, some records of muir-burning feuds. Antagonisms of a quite moderate nature at the first assumed strength with the rise of sporting rents and the partial shrinkage of proprietorial returns from grazings.

The existing practice of heather-burning north of the Border is controlled by the Act passed in the reign of George III., session 1772-73, the purpose of that Act being "the more effectual Preservation of the Game in that part of Great Britain called Scotland," and the repealing and amending of several game laws up till then in force. By the Act just referred to, every person who should "make muir burn" in Scotland from the 11th day of April to the 1st day of November was rendered liable to fines of £2, £5, and £10 for first, second, and third offences; or failing payment, to periods of six weeks, two months, and three months imprisonment. It was provided, however, that proprietors of high and wet muirlands could give their tenants written permission to burn the heather up to the 25th day of April; but the writing authorising the tenant to act had to be recorded "in the sheriff or steward court books of the county or stewartry" within which the lands were situated.

It is a happy circumstance that the practice of heather-burning as pursued in these days causes much less than the old measure of discord. Grazing tenants still complain that

burning is generally under done, while some sportsmen take the opposite view of the situation. In the notes which follow, the writer has pleasure in giving the opinions of representative men on the various phases of the "burning question." He has had communications of great practical value from Lord Willoughby de Eresby; Messrs William and Archibald Whyte, Spott and Glenmoy; Mr John Robertson, Balmacneil (formerly factor to the Duke of Atholl); Mr George Malcolm, Invergarry; Mr John Archibald, Overshiels; the late Mr William Dunn, Kenmore (one of the best of men and most practical of factors); Mr Tom Speedy, the noted sportsman, Edinburgh; Mr Robert M'Diarmid, Castles, Lochawe; Mr Duncan M'Diarmid, Camusericht; Mr John Craig, Innergeldie; Mr Thomas Watters, Glenample; Mr John Coubrough, Milugavie; Mr James Murray, Low Ploughland; Mr Peter M'Intyre, Tighuablair, Comrie; Mr James Hamilton, Woolfords; and several others who do not wish their names to be made public.

The discussional heads placed by the writer before the various correspondents were—(1) Age which heather should not exceed without burning in the writer's district; (2) Whether burning should be undertaken by proprietor, grazing tenant, or both; (3) Burning in strips—whether always practicable with few hands; (4) Time limit—any suggestions on existing law and practice; (5) Health of sheep and grouse as affected by heather-burning.

As Lord Willoughby de Eresby almost takes a line of his own in dealing with the question, a summary of his communication may be given at the outset.

In his lordship's opinion it is impossible to lay down hard and fast rules regarding the age at which heather should be burnt. The older the heather at time of burning, the longer will the new take to grow. On some Yorkshire moors five-year-old heather is mature enough, but on the majority of Scottish hills heather of that age is only just showing. It is doubtless best for grouse and sheep that heather should be burnt in patches; but on neglected moors—all old heather—it is difficult to regulate burning once it is taken in hand. A longer period for burning might be allowed where ground is naturally late and wet, as it is often covered with old heather useless for grouse or sheep, and can only be burnt in exceptionally dry years. It is quite possible to have a light stock of sheep and a fair show of birds, both doing well. On many Scottish moors heather has been recklessly burned, and destroyed by overstocking with sheep. Where heather has been destroyed, nothing will make it grow again except complete rest from sheep for two or three years. At the present time many landowners deeply regret that hills once covered with heather and abound-

ing with grouse are now coated with grass. After referring to the fall in grazing rents and the rise in value of grouse-moors, his lordship considers that heather-burning should be undertaken by the proprietor. The views of the other correspondents are given under the several headings.

Age Limit for Heather.

All the correspondents agree that each locality should have its own general regulations in regard to heather-burning, as the age at which the plants cease to be useful or reproductively effective is governed by the nature of the soil, the climate, and altitude. In the northern parts of Scotland most of the heather grows slowly; in the southern counties growth is somewhat rapid, but between these extremes there are remarkable differences even on neighbouring ranges of hills. One side of a valley may be composed of deep good land where grass and heather grow with great vigour, while the other side may lie near rock or over poor thin lands, the result being weak general herbage and a small plant of heather. The best side of a valley is sometimes at the back of the sun. The Crossflatt and adjoining north-looking parts of the Muirkirk grazings, for instance, with their depth of soil and moderate throw into the shade, face a thin dry stretch of country awaiting in average feeding resources.

Coming to the practical question as to when heather should be burnt, Mr Malcolm favours a six to eight years' period on the best Inverness-shire land. On the west side of the Caledonian Canal, however, growth is very slow, and if the plants are allowed to attain great age and rank habit before being burnt, resprouting is feeble, and the heather sometimes dies out.

A West Aberdeenshire correspondent favours burning every ten years or once in nineteen; a Kincardineshire grazier takes much the same view. The Messrs Whyte, although laying down no definite course, state that burning as a rule is "much too long in being done." Mr Robert M'Diarmid says that Argyllshire heather does not appear to have the vigour and vitality of the Perthshire plants. In some places it comes up very slowly after burning, and the brackens appear rapidly on the burnt spots. Mr Malcolm, Mr Watters, Mr Coubrough, and several others make passing references to the bracken question in dealing with land which is going out of heather.

Mr Duncan M'Diarmid thinks that the burning of a tenth or twelfth of heather every year is fair on average kinds of hill ground. On good land in West Perthshire Mr Craig would favour a general age limit of ten years for heather, but on thin

rocky land he would be inclined to give the plants a fifteen years' period. Within certain limits, firing increases the rate of growth. This is seen when the flames are allowed to "stray" from rank old growth to a seven or eight years' product. The spot occupied by the latter makes by far the more rapid recovery. Mr M'Intyre has land which would be benefited by a seven or eight years' course of burning, but in general he agrees with Mr Craig. In Glenample Mr Watters has found the rate of growth somewhat slow, and burning at twenty years' interval has been favoured. Upon the whole he considers the taking of about a twentieth in strips fairly correct practice.

Mr John Robertson would burn a tenth at the least on good moors, but he has a difficulty in fixing upon an approximately correct proportion where the soil is dry, black, and peaty, as the plants are of little or no use there, and never come to rank growth. Mr Dunn said: "It is difficult to state the age at which heather becomes useless to sheep and grouse, as the plants thrive so differently according to the nature of the soil. It is a mistake to let heather get so high that birds cannot reach the tops." He contended that there should be young heather all over a hill, so that sheep and grouse could spread out and have clean feeding. When the comparatively young heather had attained strength enough to shelter birds, he would set fire to the rank material alongside. Another Perthshire correspondent says: "Why should heather be allowed to turn grey with age? By that time it begins to decay at the roots. I am greatly in favour of burning the heather before it is so strong and rank that neither man nor beast can walk through it." Mr Coubrough, looking at the question from the Campsie standpoint, makes practically the same statement in slightly different words. Ground once covered with fine heather is now green or infested with bracken, and in his opinion the result is mainly, if not entirely, due to long-deferred burning. A correspondent of extensive experience in grazing and sport says: "Sheep rarely touch the very old heather. It may act as a cover for grouse and render them more approachable over dogs, but in wet weather it is a veritable death-trap for young birds."

Mr John Archibald, referring to Overshiels, which his father entered in 1847, states that on the very high land where there is little but heather, moss, and deer hair, which sheep could not reach in a storm, burning has been practised whenever the spring weather has been suitable. In general he favours burning in rotation. A mixture composed of some white bent, a good deal of stool bent, and common heather should not be burnt oftener than three or four times in the course of a lease. He

would burn the useless white bent every season if he could do so without damaging the stool bent and heather. In his opinion no kinds of land should be burnt till the month of March. Sheep-farmers and herds of a century ago were wont to say that heather shed its seeds in February. He agrees with that view. Heather grown on "earthy land" is in most danger, as a rule, when it is allowed to get very old. It decays at the roots, and burning is apt to make it disappear altogether.

Mr Murray says: "Heather in this district [Darvel] should be burnt every seventh year. If it is allowed longer time it comes more slowly, and is of much less use to either sheep or grouse." The same view is taken by Mr Hamilton, who notes that heather in his district "should never be more than seven years old." On some kinds of land it requires to be taken younger. In general he would keep heather to a rotation, just like a crop on an arable farm.

Mr Speedy says: "You may take it as a general rule that the oftener heather is burnt the quicker it grows. Experience has proved that by keeping heather short it is good for grouse and sheep. At the same time, rough heather is necessary when the ground is covered with snow, as birds require shelter. On the majority of Highland moors ten per cent of heather should be burnt every year where this can be accomplished, but there are places where, in consequence of late snow and wet seasons, it is difficult to burn at all."

Mr Archibald, adding a note from the sporting view point, states that the head of grouse has greatly increased in his part of the country since heather-burning was taken up systematically. He instances one farm on which sheep and grouse were vastly improved by a rational system of heather-burning. At the beginning of the lease the bag of grouse was 75 brace. In 1902, 600 brace were killed in three weeks. At Whitsunday a handsome rent was paid by a sporting tenant, and the sheep stocks were cleared away, "but the result from the shooting aspect is a great failure."

In this connection a correspondent of great experience notes: "I know moors that have been utterly ruined for sporting purposes owing to want of burning. I am almost at a loss to account for the general deterioration of grouse on lands which they occupy all to themselves, but birds are actually fewer and less vigorous on moors which were cleared of sheep seven or eight years ago. During a heavy snowstorm, when a speck of black ground can hardly be seen, the birds follow a flock of sheep in hundreds to get a picking at the heather. In summer and early autumn the constant nibbling of the heather by sheep sends up fresh shoots which are most palatable to the birds. As to whether the droppings of the sheep keep the heather

sweet I cannot say, but I always notice plenty of grouse where the sheep rest at night." Mr Coubrough also strongly supports the sheep and grouse combination.

Burning : By whom Done.

The majority of the writer's correspondents agree that the burning of heather should be overtaken under the general direction of the proprietor, the actual work being done by the servants of landlord and tenant. In Mr Malcolm's opinion, "the best arrangement is where the landlord and tenant deal with the matter jointly. The tenant states what parts he would like burnt, and at what time, and he has assistance from the keepers. On the estates here the tenants are entitled to have one-tenth or less burnt annually. That applies to heather only. There is no limit to the burning of bent or other coarse grasses. The more of such burnt in spring the better, where the rough herbage is not mixed with heather."

"In all cases," says Mr Speedy, "heather should be burnt by the proprietor. Let the assumed proportion be what it may, shepherds are very apt to place more reliance on a box of matches and the winds of heaven. As a rule not more than half an acre should be burnt in one place."

Mr McIntyre says: "All leases of hill-grazing should state clearly what proportion of heather is to be burnt in each year, and that all decaying heather is to be dealt with first, as far as possible." The work in his view of it might be done jointly, but he thinks that the grazing tenant is generally the fitter of the two parties to keep the heather in good order. Joint action is advocated by Mr Craig, but he considers that the ground should be gone over by both parties some time prior to the burning season, so that the representatives of landlord and tenant may be ready to take prompt action when the weather is suitable. As matters usually go, "time is wasted waiting each other's convenience, and disputes arise over the land due to be burnt."

Mr Watters would have the work of burning shared by proprietors and the two classes of tenants. The lack of dry seasons is the real trouble. Nine-tenths of the other correspondents advocate joint action in burning, and most of them lay stress on the carrying out of lease conditions. A West Aberdeenshire correspondent says: "It does not matter whether the burning is done by proprietor, tenant, or jointly, but it should be done with good sense and justice." Mr Hamilton's only comment is, "It makes no difference who does it, provided it is done." "The grazing tenant should have entire control of heather-burning," urges Mr Murray; "what is good for sheep feeding is

good for grouse, and little cover is required in this part of the country, as shooting is entirely done by driving."

Incidentally it may be stated that many complaints against gamekeepers were received. A Lothians flockmaster, in no way given to speaking or writing in haste, said: "Of all men I know, none are so absolutely ignorant of their occupation as gamekeepers." A northern grazier wrote: "Why should I, and men like me, be under the orders of an inexperienced gamekeeper when heather is to be burnt?" From a Perthshire correspondent there came the note, "I have occasionally lost a season in heather-burning because the keeper could not turn up on certain fine days. I do not blame the man: the system is bad."

Burning in Strips.

Burning in strips commends itself to the majority of proprietors and sportsmen, but many grazing tenants look upon "stripping" as waste of time and resources. The common difficulty is the controlling of the flames, especially when the wind blows across the general line intended to be taken. "Burning should always be done in strips or knolls of limited extent," says Mr Malcolm, "not only as a precaution against destructive flames but in the interests of grazing and shooting tenants, as affording a better distribution of healthy heather food for sheep and grouse." Mr Dunn, who dealt very carefully with this point, wrote: "Where the surface of the ground is plain, burn in strips, but where the land is broken by burns and springs, take the sides of the streams, and be sure to make roads to the water so that the old bird can take her brood to drink." He did not think it good practice to burn the tops of knolls quite bare, especially where land is thin and hard. In a wet year he had seen the tops and ridges completely burnt. The next snowstorm filled the hollows, the sheep had to be hand-fed, and the grouse had to go elsewhere.

"Burning in strips is a good system in theory, but is difficult in practice," says Mr Craig. "A large number of additional hands must be imported for the stripping work, and as their time is mostly taken up with the beating out of the flames little progress is made in a day." With ewes approaching the lambing, and wintering stocks coming home, it is a busy time on the hill-grazing farm, and extra labour is difficult to obtain. "Burning in long fairly broad strips is preferable," Mr Watters admits, but he is at a loss to see how "it is always practicable with few hands."

The Messrs Whyte think that strips should be of fair extent, especially on high ground where burning can be undertaken perhaps once in ten years. Mr M'Intyre considers that burning

in strips is only practicable sometimes when hands are plentiful and wind steady. A man accustomed to burn heather will first of all study the ground, also the force and direction of the wind. With these at the base of his calculations he makes few mistakes. All heather, and the fog at the roots of it, should be thoroughly dry before being set on fire, and no burning should be undertaken during severe frost.

Mr Robertson says: "The ideal burning has for its object the growing of old and young heather side by side in strips, and the keeping of a rotation," but his difficulty is in the working out with the ordinary number of hands. Mr Robert M'Diarmid's view of it is that burning in narrow strips is expensive to carry out, and is more or less a waste of time. "A fair stretch, say between two running streams, ought to be burnt."

In Mr Speedy's opinion, "it is immaterial whether burning should be in strips or patches, but the ground should be well broken up in order to provide plenty of young heather for feeding and cover for nesting."

"I am quite in favour of burning in strips when it can be done," writes Mr Murray. Mr Hamilton's comment is, "It is not practicable with average strength in dry windy weather." In the main the "stripping" method of which so much has been spoken and written for twenty or thirty years is not strongly favoured by those who have had to undertake, in rapid snatches, the practical work of burning.

Time Limit for Burning.

In the majority of cases little fault is found with the existing law, but correspondents with experience of late, wet, and back-lying moors are agreed that the regular time limit should be further on in the season than the 11th of April. Mr Malcolm would not have any fresh legal alteration. "It is true," he says, "that years often occur, especially in the north-west Highlands, when practically no profitable heather-burning can be done. I endeavour to meet this by (a) securing the statutory extension of time; or (b) by allowing an increased area of burning in the year following any specially wet spring. On many estates where nobody is concerned except the landlord and his sporting tenant—such as in deer forests—little attention is paid to the statutory limit of time, and burning is carried on into May when it cannot be done sooner."

Mr Dunn's note on the matter is: "There is no reason why heather on high ground should not be burnt any time after the shooting season ends, and before hatching begins. Under the existing law the extension of time to the 25th of April is, of course, a simple enough matter. The proprietor, or his repre-

sentative, has only to intimate the extension to the sheriff-clerk of the county, and pay 1s. for the recording of the same."

Mr Watters thinks that there is no special call to alter the law. He has never heard of a proprietor refusing an extension to the 25th of April. "It has often occurred to me, however," he says, "that heather might be burnt at the end of the year in dry fine weather without hurting any one's interests." In Mr Craig's opinion the present time limit "might safely be extended to 18th April in ordinary seasons, and to 1st May in late cold years. Plenty of heather in West Perthshire on high back-lying lands can seldom be burnt within the present limit of time. The snow lying on these lands keeps the whole face of a hill quite wet and unfit for burning. On grounds of this class, over 1500 feet above sea-level, the limit might be extended to 1st May, or as near that time as possible. Much land of the kind now indicated is entirely ruined by very old heather."

Mr Robert M'Diarmid is practically of the same opinion as Mr Craig. The view taken by Mr Duncan M'Diarmid is that the regular time limit should be extended to the 24th or 25th of April "in the case of high back-lying grazings." He further notes, "When a season is not suitable for burning, double the usual extent should be dealt with next time, if the weather is favourable." "A few days after the 11th would be of great advantage on back-lying land," is Mr Coubrough's comment. Mr M'Intyre finds little fault with the existing law. "In ordinary seasons," he says, "there is sufficient time for burning prior to the 11th of April, and when a wet season interferes, all arrears of burning should be overtaken the very first opportunity. I am not aware of any extension having ever been applied for in this district."

The Messrs Whyte agree in general with Mr Craig and the Messrs M'Diarmid. "On very high grazings no harm would be done to grouse although the regular time limit were the 25th of April." Mr Robertson's note is, "I think that on high grounds and in bad seasons the time limit might be extended beyond the 25th of April, due care being taken, of course, that injury was not done to nests. On high moors, where no burning can be overtaken for several years, a larger proportion than ordinary should be taken at the first suitable opportunity, otherwise the heather may get out of hand." Mr Murray is fairly satisfied with the 11th of April, but he does not think that enough is done within the statutory time. His neighbour, Mr Hamilton, would have an extension of time in late seasons. "I would not alter the time limit," Mr Speedy says, "as I have seen grouse eggs destroyed when everything was supposed to be safe." Other correspondents complain that due allowance is not made when they happen to have two wet seasons in succession.

Health of Sheep and Grouse.

Every correspondent agrees that sheep and grouse are improved in health by judicious heather-burning. Mr Malcolm is convinced that "the health and welfare of sheep and grouse are greatly influenced for the better by regular and judicious heather-burning. The old imaginary antagonism between the interest of the sheep farmer and that of the sporting tenant is now happily extinct, so far as burning of heather is concerned." "I am certainly of opinion," writes Mr Robertson, "that there is nothing worse for sheep or grouse than old heather. It is indigestible and consequently injurious; it debars sheep from a free range, as they will not go through it of their own accord. Young grouse get drowned in it during a wet season, while numbers of birds get lost or hanged in the long stems. The best burnt ground I am acquainted with is in the Clova district of Forfarshire, and you know the quality of the stock there." The outcry about deterioration of hill-grazings is really due, in Mr Craig's opinion, to the letting of so much land "run wild for want of burning." The feeding range is restricted, the quality of the stock is lowered, and the death-rate is increased. "A well burnt moor in the centre of indifferently burnt areas will attract birds from all directions; and there can be no question that grouse fed on nutritive easily digestible food are much better able to resist disease than are the birds which live on the very reverse."

The Messrs Whyte are certain that sheep are much healthier on lands which are well burnt. Grouse are the first to benefit from growth of young heather and the first to suffer from excess of old plants. An extensive east country grazier asks, "Who has ever seen a grouse nest in a bed of rank old heather?" On several points Mr Speedy is at variance with a number of the graziers, but he has "no doubt that the health of grouse is affected by heather-burning, as the birds thrive much better where there is plenty of young heather for food." "I know from my own experience," writes a flockmaster, "that a liberal amount of burning has most certainly reduced trembling. It is further a matter of common knowledge that where the land has been cleared of sheep, the stags lose weight and the grouse become fewer." "Not nearly enough attention is paid to the burning of hill ground," said Mr Dunn. "From long experience I am convinced that heather should be worked in rotation. What is good for grouse is good for sheep." Mr M'Intyre, Mr Archibald, Mr Murray, Mr Hamilton, Mr Coubrough, and other correspondents are agreed that sheep and grouse never thrive better than when they have an ample range of fresh young heather.

Concluding Remarks.

From what has been advanced in the foregoing notes, it is clear (1) that a rotation should be adhered to as much as possible in the burning of heather; (2) that grazing tenants are frequently thrown out of a rotation (a) on account of a wet season, (b) while waiting for the proprietor's representative, the gamekeeper, and (c) because the want of burning in one season is not made good at next opportunity; (3) that burning in strips is only practicable under exceptional conditions; (4) that the time limit for burning might be permanently extended in the case of very high or back-lying lands; (5) that systematic burning of heather favours the health of sheep and grouse by extending and improving the feeding range.

The grazing tenant should see that his lease conditions are quite unambiguous on the question of proportion of heather which he is at liberty to burn in one year. It is to be regretted that the practical control of heather-burning should be so much in the hands of gamekeepers,—zealous men, frequently narrow in cast of mind, and often of the most meagre scientific training in animal and vegetable life. Hitherto no grounds have been so much mismanaged as many of our Scottish moors. They have been subjected to haphazard burning at irregular or long intervals of time, also to overstocking or one-sided stocking. The results of such treatment are seen in deterioration of sheep and grouse, lowering of grazing and shooting rents, and loss of a once fair reputation.

It is a debatable point as to whether heather should be burnt during fine dry weather at the beginning of winter. The majority of old graziers held that burning at that time of year put re-sprouting in danger on account of frost; and they were probably correct. In November and December it is difficult to find the valuable common heather—the *Calluna* (*Erica*) *vulgaris*—and the undergrowth of fog, free enough from natural and acquired moisture. The bell heather, or *Erica Tetralix*, and *Erica cinerea*, or Fraoch Frangach (French Heather) of old Perthshire hill-folks, are not worthy of so much consideration, their feeding qualities for sheep and birds being of little account.

All flockmasters agree that no hill should have "cross-bars" of rank heather, as these prevent sheep from working freely up and down the slopes. When such bars are pierced by the flames and stripped into "passages," care should be taken that the burning is so thoroughly done that no grey snags are left to tear the wool off the bellies of the sheep. A flock should never be in a difficulty when making from one elevation to another. In the case of ewes coming to the lambing, it is of special importance that the ascent and descent of the grazing should

be easy. A grazing which has the valuable diaw moss or sheathing cotton sedge at a considerable altitude must of necessity be provided with good roadways of short heather, branching like so many ribs away from the area of green plants. Comparatively high-lying moss is not always covered with snow when it is required for the ewes.

With regard to the lower ranges of grazings on which the bracken pest is prone to make inroads, every care should be taken to give the heather a good fighting chance. A fair head of cattle and a light stocking of sheep would no doubt improve the green ground and the border-land of heather, but the average modern tenant of hill-grazings cannot always resort, even for a time, to changes involving considerable risk of capital. Under existing conditions he must do his utmost for the life of the common heather, by preventing it from reaching a grey old age, by setting fire at the heels of frost-bite, and by observing as much as he possibly can a sensible rotation of cropping.

RURAL DEPOPULATION IN SCOTLAND

By JOHN W. PATERSON, B.Sc., Ph.D.

In the 'Transactions' for 1897 a statistical investigation of this subject, based upon the census returns, was instituted by the present writer. The extent and locality of rural depopulation in Scotland were first considered, the facts ascertained leading up to a discussion of its causes and consequences. The period investigated embraced the years 1841 to 1891. With the publication of the census records for 1901 during the past twelve months it is now possible to bring the previous article up to date.

It is generally admitted that movements in the population of country districts are closely related to developments in the agricultural situation. Their causes, which are somewhat complicated, may be of a social, an economic, or a technical kind. Their results are probably simpler, and the whole subject forms a fruitful topic of debate. It is hoped that the facts compiled with great care for these papers may be of some service in affording a statistical basis for such discussions.

In the census of Scotland a "town" contains as an urban place from 2000 inhabitants upwards. A "village" has from 300 to 2000 inhabitants. The "rural population" makes up the rest of the country. In these articles the official definition of "towns" has been adhered to, but the "villages" have been

clubbed with the "rural" for the purposes of our inquiry. Our "rural population" is thus that part of the people living outside towns of 2000 inhabitants.

Before going on to view the matter for rural districts, the statistics for the whole kingdom call for notice. Table 1 gives the total number of inhabitants in Scotland at decennial periods covering a century.

TABLE 1.

Year	Population.	Increase	Increase per cent.
1801	1,608,420	...	...
1811	1,805,864	197,444	12·27
1821	2,091,521	285,657	15·82
1831	2,364,366	272,865	13·04
1841	2,620,184	255,798	10·82
1851	2,888,742	268,558	10·25
1861	3,062,294	173,552	6·00
1871	3,360,018	297,724	9·72
1881	3,735,373	375,555	11·18
1891	4,025,647	290,074	7·77
1901	4,472,103	446,456	11·09

During the whole period the population had much more than doubled, the actual increase being 178·04 per cent. At intermediate dates a substantial although unsteady growth was maintained. Of special importance here are the figures for the final decade. The absolute increment during 1891-1901 was easily the greatest on record. Viewed relatively to population, the rate of increase during the period was also high, and had indeed only once been exceeded since the early part of the century. Interesting is it to add regarding total populations, that Scotland surpassed Ireland at 1901 for the first time, the difference representing 13,328 persons.

Scotland is divided into 33 civil counties. While the whole country in the last ten years had increased by nearly half a million, 15 of those counties had contributed nothing to this growth. Indeed they showed a decline, their percentage decreases for the decade being as stated in Table 2.

TABLE 2.

County.	Percentage total decrease.	County.	Percentage total decrease.
1. Selkirk . . .	15·78	9. Dumfries . . .	2·25
2. Wigtown . . .	9·36	10. Sutherland . . .	2·08
3. Caithness . . .	8·90	11. Shetland . . .	1·90
4. Roxburgh . . .	8·78	12. Kirkcudbright . . .	1·51
5. Orkney . . .	5·76	13. Argyll . . .	0·60
6. Berwick . . .	4·54	14. Banff . . .	0·32
7. Clackmannan . . .	3·35	15. Inverness . . .	0·02
8. Ross and Cromarty . . .	2·80		

Growth of general population was thus entirely localised in the remaining 18 counties. Exclusive of foreshore and tidal water, the area of Scotland comprises 19,458,503 acres. Of this, the 15 decreasing counties represented 62·63, and the 18 increasing counties only 37·37 per cent.

The aggregate population of the decreasing counties at 1901 was 693,511; of the increasing counties 3,778,592. The average density of population in the decreasing counties was thus 31·2, and in the increasing counties 332·5 persons to the square mile.

These facts naturally suggest that a larger proportion of the population in the increasing counties must have lived in the towns. Particulars are given in Table 3, the counties being placed in two groups.

TABLE 3.

Decreasing counties (1891-1901).			Increasing counties (1891-1901).		
County.	Total population (1901).	Percentage living in towns (1901).	County.	Total population (1901).	Percentage living in towns (1901).
Shetland . . .	23,166	16·12	Nairn . . .	9,291	48·29
Orkney . . .	28,699	21·47	Elgin . . .	44,800	37·22
Caithness . . .	33,870	34·35	Aberdeen . . .	304,439	58·23
Sutherland . . .	21,440	0·00	Kincardine . . .	40,923	34·12
Ross and Cromarty	76,450	8·33	Forfar . . .	284,082	83·87
Inverness . . .	90,104	27·91	Perth . . .	123,283	40·88
Baith . . .	61,488	30·02	Fife . . .	218,840	59·44
Clackmannan . . .	32,029	70·00	Kinross . . .	6,981	32·86
Argyll . . .	73,612	27·83	Stirling . . .	142,291	61·44
Berwick . . .	30,821	15·06	Dumbarton . . .	113,865	75·87
Selkirk . . .	23,356	85·23	Bute . . .	18,787	49·92
Roxburgh . . .	48,804	54·59	Renfrew . . .	268,980	87·52
Dumfries . . .	72,571	36·39	Ayr . . .	254,463	67·71
Kirkcudbright . . .	39,383	38·25	Lanark . . .	1,339,327	89·18
Wigtown . . .	32,685	25·21	Linlithgow . . .	65,708	58·23
			Edinburgh . . .	488,796	87·43
			Haddington . . .	38,065	40·53
			Peebles . . .	15,066	49·44
Total . . .	693,511	31·17	Total . . .	3,778,592	76·86
Percentage living in rural districts . . .	...	68·83	Percentage living in rural districts . . .	...	28·14

All in all, the population of the increasing counties was mainly urban; in the decreasing, mainly rural. (The exceptional position of Selkirk here with a largely town population is explained by a decrease of 21 per cent in Galashiels during the decade.) A general survey of the facts therefore warrants the assumption that the towns of the increasing counties must be closely involved in their increase, and that if all the counties

were considered apart from their urban populations, a local depopulation more intense and widespread than that indicated in Table 2 would be apparent. Let us turn therefore from the *total* to a survey of the *rural* populations.

In Table 4 are stated the rural populations of each county at 1891 and 1901, together with their respective gains and losses during the period.

TABLE 4.

County	1891	1901.	Gain in ten years	Loss in ten years
Shetland . . .	24,781	23,625	.	1,156
Orkney . . .	24,829	22,538	...	2,291
Caithness . . .	24,729	22,236	...	2,493
Sutherland . . .	21,896	21,440	..	456
Ross and Cromarty . .	73,041	70,079	..	2,962
Inverness . . .	67,396	64,951	..	2,445
Nairn . . .	5,141	4,804	..	337
Elgin . . .	28,120	28,123	3	...
Banff . . .	43,615	43,025	...	590
Aberdeen . . .	130,688	127,159	...	3,529
Kincairdine . . .	28,051	26,960	...	1,091
Forfar . . .	47,832	45,828	...	2,004
Perth . . .	74,609	72,949	...	1,660
Fife . . .	87,193	88,751	1,558	..
Kinross . . .	4,638	4,687	49	...
Clackmannan . . .	11,333	9,609	...	1,724
Stirling . . .	49,366	54,870	5,504	...
Dumbarton . . .	25,613	27,478	1,865	...
Argyll . . .	55,565	53,150	...	2,415
Bute . . .	9,206	9,409	113	..
Renfrew . . .	30,139	33,581	3,442	...
Ayr . . .	81,871	82,158	287	...
Lanark . . .	126,533	144,958	18,425	.
Linlithgow . . .	24,742	30,728	5,986	...
Edinburgh . . .	63,527	61,430	...	2,097
Haddington . . .	22,972	22,094	22	...
Berwick . . .	27,454	26,152	...	1,272
Peebles . . .	7,534	7,619	85	...
Selkirk . . .	3,948	3,449	..	499
Roxburgh . . .	24,976	22,162	...	2,814
Dumfries . . .	47,896	46,165	...	1,731
Kirkcudbright . . .	26,071	24,320	...	1,751
Wigtown . . .	27,537	24,445	...	3,092
Totals . . .	1,352,932	1,351,862	37,330	38,400

It will be apparent at once that a large amount of local depopulation has occurred during the decade. While considered in regard to their total populations (Table 2) 15 counties showed a decrease; with their town inhabitants excluded the number now rises to 21. In Table 5 the loss of rural population in these 21 counties is stated in terms per cent of the rural population of each at 1891. On comparing

TABLE 5.

County.	Percentage rural decrease.	County.	Percentage rural decrease.
1. Clackmannan	15·21	12. Forfar	4·19
2. Selkirk .	12·64	13. Ross and Cromarty	4·06
3. Roxburgh	11·27	14. Kincardine	3·89
4. Wigtown	11·23	15. Inverness	3·63
5. Caithness	10·08	16. Dumfries	3·61
6. Orkney .	9·23	17. Edinburgh	3·30
7. Kirkcudbright	6·72	18. Aberdeen	2·70
8. Nairn .	6·56	19. Perth .	2·22
9. Shetland	4·67	20. Sutherland	2·08
10. Berwick	4·63	21. Banff .	1·35
11. Argyll .	4·35		

the results with Table 2 it will be further seen that the rate of decrease is also greater for the rural than for the total population in each county where the comparison is available. Selkirk, containing Galashiels, forms the solitary exception to this rule.

Looking to the extent and nature of rural depopulation in these counties within the last ten years, it is necessary to glance back at the history of the movement up till 1891 in order to mark the present tendency of events. Before going on to summarise the facts as existing at 1891, a word of explanation is required in regard to the figures.

In our earlier article the rural populations of each civil county at six census periods up till 1891 were calculated with certain proper precautions which are described. Among others, the "towns" of 1891 had to be recognised as "towns" at the earlier periods even when below the 2000 limit. The necessity for this will be obvious. Between 1891 and 1901, however, readjustment of area has now taken in 25 of the 33 civil counties, chiefly by orders of the Boundary Commissioners, partly of the Secretary for Scotland. The new counties thus mostly differ from the old, and in Table 4 the figures for 1891 have been recalculated at 1901 to suit the new areas, and to make them comparable with the latest census. With this alteration unavoidable, occasion has been taken here at the same time to adopt a new class of "towns"—the towns of 1901—for finding the rural populations at both dates. It is owing to those area changes and the adoption of the 1901 towns that the rural populations of 1891 differ in the previous article, and in this.

These remarks do not in any way affect the reliability of the tables for the different period with which each deals. It will be apparent, however, that comparisons of *absolute* rural population cannot be carried across 1891 from the one period to the

other for the great majority of counties. The exceptions are Shetland, Caithness, Sutherland, Bute, Kirkcudbright, and Wigtown. In these no alteration either in area or in number of "towns" has taken place.

TABLE 6.

County.	Date of maximum rural population.	Maximum rural population.	Decrease at 1891.	Percentage decrease of maximum population.
1. Argyll . . .	1841	86,825	30,342	34·96
2. Kinross . . .	1851	8,924	2,644	29·63
3. Perth . . .	1841	102,209	27,684	27·09
4. Kirkcudbright . . .	1851	33,697	7,626	22·63
5. Inverness . . .	1841	88,299	19,837	22·47
6. Wigtown . . .	1851	35,052	7,515	21·44
7. Caithness . . .	1861	30,180	5,451	18·06
8. Roxburgh . . .	1861	32,670	5,714	17·19
9. Dumfries . . .	1851	59,672	10,330	17·31
10. Berwick . . .	1851	32,742	5,172	15·80
11. Sutherland . . .	1851	25,793	3,897	15·11
12. Selkirk . . .	1841	4,215	626	14·85
13. Nairn . . .	1851	6,979	974	13·96
14. Shetland . . .	1861	28,552	3,771	13·21
15. Forfar . . .	1851	55,831	6,357	11·39
16. Clackmannan . . .	1851	13,058	1,208	9·25
17. Kincardine . . .	1861	30,984	2,778	8·97
18. Haddington . . .	1861	25,203	2,123	8·42
19. Peebles . . .	1861	8,233	688	8·35
20. Orkney . . .	1861	28,855	2,328	8·07
21. Ross and Cromarty . . .	1851	78,326	6,202	7·92
22. Bute . . .	1841	9,951	655	6·58
23. Fife . . .	1851	94,871	6,033	6·36
24. Aberdeen . . .	1881	134,198	6,214	4·63
25. Elgin . . .	1861	29,359	1,257	4·28
26. Ayr . . .	1881	93,110	3,615	3·88
27. Banff . . .	1871	43,279	1,319	3·05
28. Renfrew . . .	1861	37,420	447	1·12
29. Dumbarton . . .	1891	29,757	...	...
30. Edinburgh . . .	1891	65,282	...	...
31. Lanark . . .	1891	139,692	...	...
32. Stirling . . .	1891	48,332	...	...
33. Linlithgow . . .	1891	25,606	...	...
Scotland . . .	1851	1,442,018	47,669	3·31

It is possible, however, by a use of the figures of the earlier and later periods to arrive approximately at the *relative* rural populations of each county from an early census right up till 1901. An example may be quoted. If the population of Selkirk at 1851 (3673) be taken as 100, then the population of Selkirk at 1891 (3589) equals 98 for the same unaltered county. After readjustment of area the 1891 population of Selkirk appears as 3948. If this be again taken as 98, then

the population of Selkirk at 1901 (3449) will equal 86. As the Selkirk of 1851 is different from the Selkirk of 1901, such relative numbers cannot claim to give a precise statement of facts for a definite area. As, however, the area changes in most counties were relatively small, and in all cases took effect upon the actual marches of the old counties, the defects of the method are not radically important.

Before going on to this use of percentages the absolute numbers for the *earlier period alone* may be summarised. In Table 6 are stated the maximum rural population of each county, the year at which the maximum was reached, and the absolute and percentage losses recorded in each case up till 1891.

In many cases the decline had been serious. Thus from its year of high-water mark one county (Argyll) had lost over one-third of its rural population, other 5 counties lost over one-fifth, while other 9 counties lost over one-ninth. In 5 counties only had there been no rural depopulation up till the census of 1891.

In comparing the nature of rural depopulation up till 1891 with that of the succeeding ten years, attention may now be directed to two main points:—

First, The class of county most affected.

Second, The compensating rural gains.

In regard to the class of county, rural depopulation in its beginnings was generally more severe in the crofting than in typical agricultural counties. Thus up till 1891 the heaviest actual losses were recorded in Argyll, Perth, and Inverness, while these counties, and in a minor degree Sutherland, all occupied a high place in the order of relative decrease. Reference may be made to Table 6 for details. On further comparing this table with Table 5, however, it will be seen that a change has been developing in the last ten years. The agricultural counties are now most severely affected. Particularly noticeable in this respect is the low position of the crofting counties mentioned, in the order of relative decline. These (Table 5) now stand far down in the black list. On the other side of the question it is notable that the county of Edinburgh shows a rural decline at 1901 for the first time in its history.

This growing tendency of rural depopulation to attack the typical agricultural counties will also be apparent from Table 7. Here the relative rural populations of each county at 1851, 1891, and 1901 are stated, the populations of the earliest date being taken as 100. The method adopted for finding these figures and the reservations attaching to them have been described.

TABLE 7.

County.	1851.	1891.	1901.
Shetland . . .	100	88	84
Orkney . . .	100	95	86
Caithness . . .	100	85	76
Sutherland . . .	100	85	83
Ross and Cromarty . . .	100	92	88
Inverness . . .	100	80	77
Nairn . . .	100	86	80
Elgin . . .	100	102	102
Banff . . .	100	108	107
Aberdeen . . .	100	105	102
Kincardine . . .	100	91	87
Forfar . . .	100	89	85
Perth . . .	100	77	75
Fife . . .	100	94	96
Kinross . . .	100	70	71
Clackmannan . . .	100	91	77
Stirling . . .	100	104	116
Dumbarton . . .	100	153	164
Argyll . . .	100	72	69
Bute . . .	100	98	99
Renfrew . . .	100	110	122
Ayr . . .	100	104	104
Lanark . . .	100	134	154
Linlithgow . . .	100	155	193
Edinburgh . . .	100	136	132
Haddington . . .	100	93	93
Berwick . . .	100	84	80
Peebles . . .	100	95	96
Selkirk . . .	100	98	86
Roxburgh . . .	100	84	75
Dumfries . . .	100	83	80
Kirkcudbright . . .	100	77	72
Wigtown . . .	100	79	70

Table 7 does not indicate the whole amount of rural depopulation which has taken place in any county with the exception of those—11 in number (Table 6)—which reached their maxima at 1851. Starting at a fixed date, it shows rather the respective gains and losses of each county during an interval of half a century.

The other point—the compensating rural gains—next calls for notice.

Up till 1891, 28 counties had suffered rural depopulation (Table 6), the sum of the losses in these counties at date amounting to 172,807 persons. At 1891, however, Scotland contained only 47,669 fewer persons in its rural districts than it had ever contained, owing to certain districts going forward while others were going back. Indeed nearly three-fourths of the serious loss of rural population in certain parts had been made good by compensating gains elsewhere. Rural depopulation was less a national than a local phenomenon.

Such gains will scarcely be held to exonerate the facts for the large areas of depopulated country. Meantime it is interesting to note that this tendency to centralisation of the rural population of the country has been continued in the last decade.

From Table 4 it will be seen that the aggregate gains at 1901 nearly made good the total losses. Thus while the aggregate decline of 21 decreasing counties amounted to 38,409 persons, the increase of the remaining 12 was 337,39. The nett loss of rural population in the decade was only 1070.

The character of the counties furnishing the rural gains is significant. As at older dates, so at 1901, the increase is practically confined to counties bordering on the Forth and Clyde. Lanark, indeed, in the last period contributed nearly one-half. As these counties all contain a high percentage of urban populations, it would appear that rural increase is found only round the busy centres. And as rural depopulation is now most prominent in good agricultural counties some suggestion is thrown upon its cause. It is probably accounted for rather by an increase of suburbanism than by agricultural development. Unfortunately the area changes since 1891 in most of the counties make the point more difficult of accurate proof.

Table 8 gives the area under crops at 1891 and 1901 in six unaltered counties and in all Scotland, the figures for the earlier

TABLE 8.

County	Corn crops		Green crops		Rotation grasses		Permanent pasture.	
	1891	1901.	1891.	1901.	1891	1901.	1891.	1901.
Shetland	1000	987	1000	994	1000	1233	1000	978
Caithness	1000	961	1000	927	1000	1133	1000	1103
Sutherland	1000	952	1000	979	1000	1110	1000	1140
Bute	1000	996	1000	1000	1000	887	1000	1158
Kirkcudbright	1000	962	1000	894	1000	880	1000	1173
Wigtown	1000	953	1000	938	1000	881	1000	1132
Scotland	1000	965	1000	957	1000	978	1000	1069

period being reckoned as 1000. Except Bute these are all depopulated counties, and their decrease of corn and green crops, with an increase of rotation or permanent pasture or both, tells its own tale. The figures for Bute also offer no suggestion that its small increase of rural population was due to agricultural development, but the contrary. Indeed if we

neglect the area changes for all the counties, and use the comparative data as published in the Agricultural Returns, it would seem that the compensating rural increases of 1891-1901 came in spite of an agricultural decline in the very counties producing them. Of the total gain of 37,339 persons in these counties, over 97 per cent was produced in the six counties of Fife, Stirling, Dumbarton, Renfrew, Lanark, and Linlithgow. Taking these together as forming a separate area, it would appear that in the ten years of their increase the acreage of corn crops diminished 5 per cent, root crops 2 per cent, rotation pasture 6 per cent, while the amount of land under permanent pasture increased at the same time by 7 per cent. Apparently if the maintenance of the rural population is dependent upon agriculture it is in a bad way.

This fact is very clearly borne out by Table 9. Here the number of persons employed about farms, woods, and gardens (Agricultural Class) has been stated in terms per cent of the rural population of each county.

TABLE 9.

Decreasing rural populations (1891-1901).			Increasing rural populations (1891-1901).		
County.	Agricultural population.	Percentage agricultural of rural population	County.	Agricultural population.	Percentage agricultural of rural population.
Shetland . .	3,233	13.69	Elgin . .	4,696	16.70
Orkney . .	7,273	32.27	Fife . .	8,726	9.83
Caithness . .	5,522	24.83	Kimross . .	810	17.28
Sutherland . .	3,938	18.37	Stirling . .	4,435	8.03
Ross and Cromarty	12,637	18.30	Dumbarton	2,621	9.55
Inverness . .	12,090	18.61	Bute . .	1,739	18.48
Nairn . .	1,173	24.42	Renfrew . .	4,111	13.23
Banff . .	7,132	16.57	Ayr . .	11,079	13.49
Aberdeen . .	26,201	20.60	Lanark . .	11,204	7.73
Kincardine . .	4,968	18.43	Linlithgow	1,946	6.33
Forfar . .	9,510	20.75	Haddington	5,276	22.95
Perth . .	11,772	16.14	Peebles . .	1,408	18.48
Clackmannan . .	636	6.62			
Argyll . .	8,128	15.29			
Edinburgh . .	6,668	10.85			
Berwick . .	5,630	21.50			
Selkirk . .	1,020	29.57			
Roxburgh . .	5,372	24.24			
Dumfries . .	7,910	17.13			
Kirkcubright . .	4,954	20.37			
Wigtown . .	5,357	21.91			
Total . .	151,324	18.53	Total . .	58,387	10.96

The rural populations which have increased are employed in agriculture in a much smaller degree than the decreasing rural

populations. Particularly noticeable is this fact with the six counties just mentioned as giving 97 per cent of the total rural gains for the decade. In these counties only 878 per cent of the rural population was engaged in agriculture. From the facts we may safely assume that the compensating gains round the busy centres were due to other causes than agricultural development.

Turning to the progress of the agricultural class as a whole during the ten years, it is noticeable that the decline in this class is greater than in the entire rural community. It is nearly fourteen times greater. As the Occupation Tables do not include the dependents of those engaged in the industry, the full effect of the agricultural decline in aiding rural depopulation is only partly expressed. Details are given in Table 10 (all Scotland):—

TABLE 10.

		1891	1901
Farmer, grazier	{ Male . .	47,525	45,570
	{ Female . .	6,807	7,822
Farmer's son, grandson, brother, nephew	{ Male . .	17,081	16,726
	{ Female . .	3,248	4,650
Farm bailiff, grieve, estate manager	{ Male . .	...	5
	{ Female . .	...	5
Shepherd	{ Male . .	9,914	9,530
	{ Female . .	8	8
Agricultural labourer and farm-servant	{ Male . .	79,468	70,152
	{ Female . .	21,069	19,044
Agricultural machine proprietor and attendant	{ Male . .	197	414
	{ Female . .	...	1
Others engaged in agriculture	{ Male . .	929	1,757
	{ Female . .	...	34
Forester, wood-labourer	{ Male . .	3,283	4,081
	{ Female . .	1	9
Gardener, nurseryman, seedsman	{ Male . .	15,855	11,358
	{ Female . .	258	478
Agricultural class		<u>205,675</u>	<u>191,639</u>

In the census of 1901 only ages over ten are reckoned in the Occupation Tables all over, while at 1891 an age-limit of fifteen was recognised for some of the occupations, and all ages were included for others. In Table 10 a fifteen age-limit has here been applied to all occupations at both dates in order to get figures which are fairly comparable. In the census of 1901 also a rather large group of "Farmer's daughter, &c.," have been included in the Agricultural Class for the first time. These are omitted here. The effect in the comparative summary of the official publication is to make out a fair increase at 1901 in the number of persons connected with agriculture since the previous census.

For the whole class the decrease was 14,036 persons, or 6·82 per

cent. Foresters show a notable improvement, while gardeners show a surprising decline. Female farm-servants have decreased by 2025, or 9.61 per cent. Bailiffs, shepherds, and male agricultural labourers are best grouped together as agricultural wage-earners owing to frequent overlapping in their duties. They form the largest group. As such they show an important decline of 8298, or 8.96 per cent. This shortage of labour is probably in part accountable for a noticeable increase in the number of machine attendants.

The growing use of machinery implied has not, in face of the larger decline of workers, prevented land passing out of cultivation. The annual acreage under crops for all Scotland is stated in Table 11 as the average of two quinquennial periods:—

TABLE 11.

	1886-90 acres	1896-1900 acres	Percentage increase	Percentage decrease
Total area under crops and grass } .	4,573,364	4,890,406	0.35	..
Corn crops . . .	1,337,616	1,271,525	...	4.94
Green crops . . .	657,877	624,089	...	5.14
Bare fallow . . .	14,601	7,378	...	49.47
Flax	303	8	..	97.36
Rotation grass . .	1,655,341	1,594,891	..	3.65
Permanent pasture .	1,207,626	1,392,515	13.28	...

Little new land has been broken in, while a large acreage has passed out of cultivation into permanent pasture. With the extending use of light manures for other than root crops, it is perhaps surprising that corn shows nearly as much decline as green crop. More particularly is this the case in view of the increasing scarcity of labour.

As the nation must get food somewhere, it would seem that the decline in agricultural population and cultivated area is due to the development of other countries, and the rapid increase of transport facilities. In the ten years the shipping tonnage of the United Kingdom increased as follows:—

TABLE 12.

		1890	1900
Sailing vessels . .	tons	2,907,405	2,077,655
Steam "	"	5,037,666	7,202,509
Totals		7,945,071	9,280,164

Reckoning 1 ton of steam equal to 3 tons of sailing, Sir John Glover¹ calculates the increase of carrying power for the decade

¹ Journal of the Royal Statistical Society, 1902

at 33 per cent. With this increase there has been a large augmentation of agricultural imports. Table 13 shows the average annual imports of the principal commodities during the five years 1886-90, with the relative position of affairs ten years later.

TABLE 13.

		Average imports, 1886-90.	Relative numbers	
			1886-90.	1896-1900
Horses	o.	13,458	1000	3400
Cattle	"	438,098	1000	1255
Sheep	"	800,599	1000	758
Pigs	"	19,437	1000	5
Beef	wt.	1,342,596	1000	2638
Mutton	"	1,061,210	1000	3061
Pig-meat	"	4,637,921	1000	1704
Meat, unenumerated	"	640,002	1000	1706
Butter	lb.	1,736,738	1000	1869
Margarine	"	1,125,081	1000	824
Cheese	"	1,908,274	1000	1237
Eggs	thousands	1,123,761	1000	1597
Wheat and flour (as grain)	wt.	77,794,360	1000	1233
Other grains and meals . .	"	71,902,923	1000	1415

The population of the United Kingdom at 1891 was 37,732,922; at 1901 it was 41,458,721 persons. Taking the earlier date as 1000, the population at 1901 was equal to 1099. With the exception of live sheep and pigs, and of margarine, growth of imports therefore much exceeded growth of population. Particularly noticeable are the enormous increases in dead-meat, butter, and eggs.

It is an economic commonplace that the nation cannot import these things unless its inhabitants are employed in producing something else which can be exchanged for them. Further, it may be conceded that the nation will not take this round-about way of raising bread unless it pays it better, and the conditions of life involved in it are more congenial. These truths, however, do not minimise the significance of the large increase in imports to the continuance of rural depopulation. The cheap and growing foreign markets have partially dispensed with the need for home agriculture, which has in turn dispensed with a considerable number of those engaged in it. And we have seen that rural depopulation is greatest in those

rural districts where the population is most entirely agricultural. The relation is obviously one of cause and effect. Economically, and apart from restricted interests, rural depopulation induced in this way can only be matter for congratulation. On hygienic and ethical grounds it will probably be matter for general regret.

FERTILITY IN SHEEP.

By FRANCIS H. A. MARSHALL, B.A., F.R.S.E.

THAT the male germ-cells or spermatozoa are produced in far greater abundance than the female germ-cells or ova, and that whereas, in the case of most breeds of sheep at any rate, breeding in the ewe occurs only at a particular season of the year, and is further limited to certain definite recurrent periods during that season, the time for rutting in the ram is not so restricted, are facts with which all breeders are familiar. It is of primary importance, therefore, in looking for the causes which influence fertility, for the purposes of practical sheep-breeding, to investigate those factors which especially affect the ewe. There is evidence, however, that the employment of particular rams may have to be reckoned among these factors. To such cases I shall have occasion to refer later in this paper.

The maturation of the ova takes place in the ovaries within certain vesicles known as "Graafian follicles," while the growth of the Graafian follicles is a process which goes on, from the embryonic period onwards, throughout the whole of the animal's lifetime, or at any rate until the reproductive age has passed by. Except in abnormal cases each Graafian follicle contains a single developing ovum. The process of growth and ripening culminates in ovulation, or the rupture of the mature follicles, and consequent discharge of their ova. Ovulation only occurs (at least normally) during the sexual or tugging season at the "œstrous" or "heat" periods. Consequently the fertility of sheep must be directly influenced by the number of follicles which are brought to maturity at the "heat" periods.

This number for any one "heat" period can be determined in ewes which have recently been killed, either by counting the discharged follicles shortly after rupture, when their presence in the ovaries is easily discernible, or by noting how many *corpora lutea* are present in the ovaries of sheep during gestation; for if after ovulation the animal becomes pregnant, the ruptured follicles undergo a series of changes resulting in the

hypertrophy of their walls and the formation of structures known as *corpora lutea*, the existence of which in the ovary is approximately coincident in time with the presence of the embryo in the uterus. The following is the result of an examination of the ovaries of fifty-five pure-bred or half-bred Scotch Blackfaced ewes with which ovulation had recently occurred:—

Number of sheep in which a single follicle had ruptured at ovulation	42
" " two follicles	12
" " three follicles	1
Total	55

Thus more than one follicle had discharged in less than 24 per cent of the cases examined, while in only a single instance were three follicles found to have ruptured at an ovulation. The number examined is perhaps too small to support any general conclusion, but regarded in connection with certain other considerations, the result obtained is not wholly without significance.

Mr Walter Heape,¹ through the instrumentality of the Royal Agricultural Society of England, obtained records of the fertility of 77,850 ewes belonging to 275 flocks of different English breeds for the year 1896-97. These records show an average return of 30·14 twin lambs per 100 ewes. No similar statistics, so far as I am aware, have ever been obtained for Scotch or other mountain sheep. Such records would be of no little value as providing a means of comparison between the fertility of sheep belonging to different breeds in the Highlands and Lowlands, and that of sheep belonging to the same breeds when kept under different conditions in regard to climate, altitude, and food-supply. In the absence of statistics, however, there can be no doubt that the percentage of twins with Scotch Blackfaced and other hill sheep is very considerably less than among the breeds investigated by Mr Heape. A sheep-farmer informs me that, according to his own experience, from 1000 Blackfaced ewes not more than 40 twins are to be expected, that among half-bred Blackfaced ewes there may be about 25 per cent twins, while the percentage varies according to whether the ewes are kept on lowland pasture or on the side of a hill. These rough estimates are in general conformity with statements made to me by other flock-masters, but the twin percentage for pure-bred Blackfaced ewes is frequently said to be higher, reaching 10 or 12 per 100 ewes.

Thus there is evidence that with the particular breeds investi-

¹ "Abortion, Barrenness, and Fertility in Sheep." Journal of the Royal Agricultural Society, vol. x., 1899.

gated the usual percentage of follicles discharged at a time does not exceed the usual percentage of births at the lambing season.¹ So that the comparative absence of twins is almost certainly directly due to failure on the part of the ovary to produce and discharge a greater number of ripe ova at ovulation. An abnormally low percentage of twins is closely associated with barrenness. This fact is generally recognised by breeders, and Mr Heape's statistics for English breeds show it very clearly. And since habitually (*i.e.*, constitutionally) barren ewes are a rarity, there can be little doubt that barrenness is due normally to the same cause operating on a more exaggerated scale—*i.e.*, to the absence or great scarcity of Graafian follicles available for ovulation during tupping-time.

Scarcity of ripe follicles at the normal tupping-time in healthy ewes must result either from retardation in the development and growth of the follicles, and consequently in their maturation, or from a great proportion of the follicles having undergone degeneration, whether recently or at some previous period during the animal's lifetime. That the scarcity may be due to retardation of growth is a conclusion which is based on inference rather than on direct observation, for little is known concerning the rate of development and maturation of the Graafian follicle, since it is a very difficult if not an impossible matter on which to gather information from observation. There can be no doubt, however, that the process of ripening can be very largely influenced both by insufficiency of food-supply on the one hand and by artificial stimulation on the other.

Follicular degeneration and its effects on fertility are perhaps more easily studied, while the microscopic structure of different stages in the degenerative process has formed the subject of investigations by many Continental physiologists, who have described its occurrence mainly in rabbits, cavies, and other rodents. The follicle, instead of continuing to develop, is shown to undergo a series of retrogressive changes, resulting in the shrivelling up of the contained ovum and the final absorption of the whole of its contents. Degeneration may set in at any period in the development of the follicle, and, according to Schulin,² even in the primordial follicle. It is generally stated to occur most frequently during pregnancy, but there can be no doubt that it takes place also at other times.

According to my own observations, follicular degeneration is by no means uncommon in the ovaries of the sheep, and is most frequent among follicles that have attained to dimensions vary-

¹ The possibility that a certain percentage of the twins produced arise from one ovum must also be kept in view. Such cases of "identical twins" are known to have occurred in sheep.

² "Zur Morphologie des Ovarium." Arch. f. Mikr. Anat., vol. xix., 1881.

ing from about one-eighth to one-half of those of the mature follicle. In some ovaries I have failed to discover a single degenerate follicle, while in other cases I have noted three or four of considerable size in one ovary, or even within the limits of a single section.

The conclusions so far reached regarding the causes of barrenness and a low percentage of twins are of some importance, as they bear intimately on the question of flushing, or the artificial method adopted by some flock-masters of stimulating the breeding capacity of their sheep by giving them additional food (such as turnips, cake, or corn) shortly before or during tupping-time.

There appears to be some divergence of opinion among flock-masters with regard to the effects of flushing on fertility. Scott,¹ while recommending that the ewes should be got in good thriving condition before the tupping-season, warns breeders against attempting to bring about this result "by a process of hurried and temporary stimulation." This author especially deprecates flushing in those cases where the ewes are maintained on mere sustenance diet at other times of the year. He admits, however, that flushing may increase the number of births in the following lambing season, although stating that "the extra number of lambs raised in any one year by this system is on the average not very great," while "from actual test" he is convinced "that ewes which have been flushed one year are never so prolific the next."

It is obvious, having regard to the facts related above concerning the probable causes of barrenness and the growth of the Graafian follicle as a process which goes on not merely at tupping-time but throughout the whole of the animal's life, that the effects of flushing must vary according to circumstances, the differences depending on the ages of the ewes and the general conditions to which they have been subjected previously, since these factors must have influenced the ripening of the follicles and the proportion of them which underwent degeneration, thus directly controlling the number available for ovulation at the tupping period in question.

In view of these facts, it follows that flushing does not necessarily have the desired result even at the following lambing season, although the number of lambs born from ewes of varying ages is generally somewhat increased by this practice. Certain experiments carried on a good many years ago, under the direction of M. Charles Girou,² by whom they are described, show, however, that this result is not always attained. The details of

¹ "The Practice of Sheep-Farming." Miles's Modern Practical Farriery London

² "Expériences sur la Réproduction des Animaux domestiques" Annales des Sciences Naturelles, vol. xi., 1827.

one of these experiments are given below. In this experiment two flocks during the tupping season were placed respectively under different conditions, one of them being supplied with much richer pasture than the other. The object of the investigation was to determine the causes influencing sex,—a totally different question to that now under consideration, which is not dealt with by Girou. Consequently, in stating his results I have added together the number of male and female lambs, and given only the totals. The ages of the dams are also given.

Flock under more favourable conditions

Age of dams	Number of lambs
2 years . . .	40
3 " . . .	45
4 " . . .	26
5 " and over	26
Total . . .	137

Flock under less favourable conditions.

Age of dams	Number of lambs
2 years . . .	10
3 " . . .	29
4 " . . .	47
5 " and over	49
Total . . .	135

The number of sheep in each flock is apparently not stated, but they are recorded as having been very nearly equal in size. Two rams were provided for each flock. It is seen that the number of lambs in the flock which was submitted to flushing was only slightly in excess of that produced from the sheep placed on comparatively poor pasture. With the former, two cases of twins are recorded, but none with the latter.

In another of Girou's experiments,¹ made for an object similar to that of the first, a flock consisting of eighty-four sheep was divided into two equal halves, one-half being placed on superior pasture to the other during the tupping season, as in the former case. Forty lambs were produced in each part of the flock, so that the result brought about was identical under the two conditions.

It might reasonably be conjectured that the fertility of young sheep would be more sensibly and more usually affected by flushing on the one hand, and by adverse conditions on the other, than that of the older ewes, since with the former there has been less time and opportunity for the operation of previous environmental influences, whether favourable or otherwise. This inference is in accord with the opinion which Mr Ifeape² says has often been expressed to him, that in unfavourable seasons "shearling ewes are more liable to barrenness than older ewes." But the returns submitted to him only show definite proof of this in the case of the Dorset Horn sheep.

The result of the first of the two experiments of Girou to which I have called attention points in the same direction; for

¹ *Loc. cit.*

² *Loc. cit.*

since the flocks are stated to have been composed about equally of ewes of all ages, and although no cases of barrenness or abortion are mentioned by Giron (this not concerning the subject of his investigation), it may be inferred that some of the younger ewes among those supplied with poorer nutrition at tupping-time were barren.

Scott's statement already quoted, that sheep from which an extra number of lambs have been raised one year by flushing are never so prolific in the year following, is susceptible of a similar explanation. For a premature and forced development of an excessive number of Graafian follicles in sheep which have but one breeding season annually, however successful it might be in increasing the percentage of twin births in the ensuing lambing season, would almost inevitably, so it appears to me, result in the degeneration of many of the follicles when the forcing process was removed and before the arrival of the next time for tupping.

With the great majority of British breeds of sheep there is, as is well known, but one tupping season annually. Dorset Horn sheep, however, can produce two crops of lambs within a year. This is the case sometimes also with sheep belonging to the Limestone breed of Westmoreland and Derbyshire, the ewes taking the ram very early when suckling their lambs. I am informed, however, that when this occurs the ewes will not breed at all the year after.¹ This inability to breed is usually ascribed to general strain on the reproductive system of the ewe, but here, again, it would seem very probable that it is caused by an unusual amount of follicular degeneration during the additional gestation.

That the question of flushing, and, what is closely related to it, the question of the causes producing follicular degeneration, require further investigation, must be generally admitted, and should, in fact, be emphasised. In the meantime, perhaps, the general practical conclusion to be drawn from the above considerations is, that it is better to keep breeding ewes in good thriving condition as continuously as possible, than to submit them to a forced and rapid process of artificial stimulation at the tupping period, while maintaining them at other times of the year on mere sustenance diet. The consideration of the age of the ewe, as an important factor in determining the effects of flushing, should also not be neglected.

At the beginning of this paper I remarked that the use of particular rains might have to be reckoned among the factors which control the fertility of the ewes. Some flock-masters and

¹ For information regarding Limestone sheep I am indebted to Mr Rowland Parker of Moss End, Malothorpe, Westmorland.

shepherds go further than this, holding that the production of twins instead of single lambs in some way depends upon the choice of the ram employed.

In view of the facts stated above, it is evident that the ram can exercise no sort of control over the development of the Graafian follicles, or the number which are brought to maturity so as to admit of ovulation at the "heat" periods. There are, however, some female animals which, under certain conditions at any rate, require the additional stimulus of copulation before ovulation can be induced. This is the case with the doe rabbit, while Hausmann's observations¹ seem to indicate that sheep also cannot ovulate without the recent occurrence previously of copulation. Probably with the majority of mammals ovulation takes place independently of coition, this being the case with the mare and the bitch.

On this subject I undertook a series of experiments, which were carried on at Penicuik in connection with Professor Cossar Ewart's Biological Farm. These experiments, which are described at some length elsewhere,² conclusively prove that with Scotch Blackfaced sheep ovulation can occur independently of coition at any of the "heat" periods of the regular sexual season—*i.e.*, during November and the first part of December. In cases where the ewes come "in use" outside the regular tuppington-time, such as in February after an early abortion, it would appear that the additional stimulus set up by sexual intercourse may be necessary before ovulation can take place. In such cases where coition does not occur, the Graafian follicle, instead of discharging its ovum, undergoes degeneration. Apparently the ewe does not have sufficient stimulating power at its disposal to bring about ovulation spontaneously. These instances, however, may be regarded as abnormal in sheep, and, as I have already indicated, I have no reason to suppose that they ever occur during the regular season for tuppington. But during the "heat" periods of the ordinary season coition may occur prior to ovulation, while I have some reason for concluding that it may tend to hasten the rupture of the ripe follicles in cases where ovulation had not previously taken place at the "heat" period in question. On the other hand, there is not the slightest evidence that the occurrence of coition can in any way control the number of follicles that discharge.

It follows, then, that the ram, at any rate normally, exercises no more influence over the number of discharging Graafian follicles than it does over the growth of the follicles.

¹ Ueber die Zeugung und Entstehung des wahren weiblichen Eies. Hanover, 1840.

² "The Œstrous Cycle and the Formation of the Corpus Luteum in the Sheep." Philosophical Transactions, B, vol. 196, 1908.

There are, however, other ways by which the use of particular rams may affect the fertility of the ewes. That this is so is shown by Mr Heape's records,¹ which indicate that whereas Suffolk and Wensleydale ewes are more prolific with rams of their own breeds than with other rams, Dorset Horn ewes, conversely, are most fertile when served by Hampshire Down rams.

In some parts of the Lowlands it is customary for breeders of crosses between Border Leicester tups and Scotch Blackfaced ewes to keep Blackfaced tups to serve those ewes which have failed to become pregnant to the Border Leicester rams earlier during the same tupping season. I am informed that where this practice is adopted, as many as 50 per cent of the lambs raised in the following lambing season are frequently pure Blackfaced, having been produced by ewes which would have probably failed to get lambs had the work been left exclusively to Border Leicester tups. This is an example of variation in the capacity for breeding among rams, the variation in this case probably depending partly upon differences in climate. The conclusion that Suffolk and Wensleydale ewes are less fertile with rams belonging to other breeds than with their own rams is perhaps capable of being similarly explained.

(On the other hand, Mr Heape's statement, that Dorset Horn ewes are more barren with rams of their own breed than with Hampshire Down rams, appears to me to result from a confusion between barrenness and very early abortion or "slipping lamb." This confusion introduces an unavoidable element of error which Mr Heape recognises as present in his statistics for English sheep generally, although he states that he believes the error is, as a rule, small. This author refers to a general instability of the reproductive system of Dorset Horn ewes, and their need in some instances for a special stimulus to overcome barrenness, and he seems to suggest that this additional stimulating power is supplied by the employment of Down rams. In the light of the facts stated above regarding ovulation, which, however, were first described some time after the publication of Mr Heape's paper, his suggestion appears to me an improbable one in so far as it relates to causes overcoming barrenness. That the barrenness is only apparent, and due to unavoidable confusion with early abortion, is made all the more probable by the facts also referred to by Mr Heape, "that of all breeds the Dorset Horns appear to be most liable to abortion"; and especially by the further statement, that in some cases "Dorset Horn ewes which slip lambs got by Dorset Horn rams will bear lambs got by Down rams."² As I have said elsewhere, "I would suggest that in this case the cause of abortion lies not so much with the ewe as in want of vitality in the embryo, which, when

¹ *Loc. cit.*

² *Loc. cit.*

aborted early, is absorbed in the uterus, escaping the notice of the shepherd; and that when the Dorset Horn sheep have been served by Down rams, there is less abortion as a result of increased vigour on the part of the cross-bred young."¹

This is a suggestion which touches on the question of crossing as a preventive of abortion, especially in those cases where there is reason to suspect that the vigour of the animals has suffered through in-breeding. This is a wide question, and one which cannot be dealt with here.

The fact that sheep ovulate normally in the absence of the stimulus supplied by copulation is of some further importance, as it indicates the possibility of inducing pregnancy in the ewe by the artificial introduction of spermatozoa or male germ-cells into the uterus. It is obvious that in those animals with which ovulation, or the discharge of the ova from the ovary, only takes place as a result of copulation, artificial insemination must be futile, since the spermatozoa, after being introduced into the female, can have no opportunity of uniting with the ova, the latter remaining enclosed in the Graafian follicles of the ovary. In several animals where ovulation is spontaneous, artificial insemination is sometimes practised as a means of overcoming certain forms of barrenness, such as cases of abnormal obstruction at the entrance to the uterus, instruments being employed whereby the seminal fluid can be injected past the obstruction and into the uterine cavity. This method has been very successful in producing pregnancy artificially in mares and cows, as well as in bitches, but, so far as I am aware, it has never been adopted to overcome special forms of barrenness in sheep.

The organ of copulation in the ram is a structure of considerable complexity, the passage through which the urine and seminal fluid pass being continued for some distance beyond the end of the main glandular portion, within a fine filiform process arising from the left side. This filiform process I have shown² to be erectile, its function apparently being insertion into the entrance to the uterus during copulation; for if the filiform appendage be cut off, the ram is rendered barren, although there can be nothing to prevent the passage of seminal fluid into the vagina or chamber into which the uterus opens, and into which the male organ is inserted during copulation. Thus it would appear that the mere injection of semen into the vagina is insufficient to cause pregnancy, the spermatozoa

¹ *Loc. cit.* It is possible, however, in some cases of in-breeding, that embryonic development is arrested at the very outset, the ovum after conjugating with the spermatozoon not having sufficient vitality to undergo segmentation; or it may be that the aggregate vitality of the ovum and spermatozoon before conjugation is insufficient to bring about that process.

² "The Copulatory Organ in the Sheep." *Anatomischer Anzeiger*, vol. xx., 1901.

being unable to find their way of their own accord to the interior of the uterus. A slight want of adjustment in such an elaborate mechanism may perhaps be a source of barrenness, especially in those instances where the ram is said to be at fault. It is of interest to note that the artificial injection of seminal fluid past the vagina and into the uterus would in such cases almost certainly bring about satisfactory results.

In the present paper I have endeavoured to point out how investigations of the kind indicated, in addition to their theoretical interest, may have an undoubted bearing on the practice of sheep-farming. Lines for future inquiry readily suggest themselves. Experimental investigations on the effects of flushing with sheep of different ages and of various breeds, on the most favourable kinds of food-supply for increasing the capacity of the ewe to bear young, and on the best methods for preventing follicular degeneration and avoiding those after-effects of flushing which are detrimental to subsequent fertility, may be mentioned as specially deserving of study. Further research in these directions would, it seems to me, hardly fail to yield results of great interest and importance from the standpoint of the breeder. It is on account of the practical value of such research that I have ventured to bring this subject to the notice of the Highland and Agricultural Society.

THE INFLUENCE OF FOOD ON MILK.

By ALLAN BARNES GRAHAM, Younger of Craigallian, Milngavie.¹

THERE is no reason why our dairying industry, worked on scientific principles, should not prove as successful in this country as in any other.

No one who has studied this most interesting, yet complicated, subject can fail to admire the country which has most deservedly earned for herself the reputation of being the most successful producer of first-class butter.

Denmark deserves great praise. She has overcome all the difficulties,—internal and external,—and she does not suffer from a want of “go-aheadness” or from apathy, which, I fear, is one of the reasons of our failure in holding our own fresh-butter market; and unless we awaken we will find things

¹ The Publications Committee desire to express their thanks to Mr Barnes Graham for his interesting report.

getting worse instead of better. However, we have lately passed an Act which points to an awakening. I refer to the milk standard.

The milk standard should prove beneficial to our dairy-farmers. It should also be the means of improving our pedigree stock. By it our dairy-farmers will learn the folly of keeping cows—especially for butter-production—which yield less than 240-260 lb. of butter-fat during their period of lactation. Unfortunately much of this benefit is being undone or prevented by the “appeal to the cow.” This “appeal” would be all right were it impossible to regulate the quality of the mixed milk of a herd, or by *feeding to influence* the quantity and quality of milk.

It is surely unnecessary to say that the quality of the mixed milk can be regulated by selection of cows according to what is required. This most assuredly can be done, though of course the smaller the herd the more difficult will it be: however, the smaller the herd the greater the need for weeding out the worthless stock.

The influence of feeding on the quantity and quality of milk is another matter. This is debatable ground. To show the differences of opinion, I shall place before you extracts from leading American, colonial, and other authorities—also from Dr Robert Hutchison’s work—on this subject. These deserve careful study and comparison, and such may prove of interest when going over the following results from experiments lately conducted at Carbeth Dairy-Farm. The results of Mr Speir’s extensive experiments, published in the ‘Transactions’ for 1896 and 1897, bear out the conclusions which I quote (pp. 52, 53) from Farrington and Woll’s standard book. These experiments, however, were not designed to show the influence of the quantity of *water* consumed by the cow upon the quality of her milk.

My object in undertaking these experiments was to prove that milk can be watered through the mouth of the cow, and that therefore this “appeal” is absurd; and that by allowing it to continue we are damaging the true interest of our dairying industry.

By abolishing this “appeal to the cow,” farmers—the majority of milk-producers—will not suffer; rather the other way about. Limit the “output” and the wholesale price should average 8d. or 9d. per gallon.

The public will also not suffer: it is better to pay 4d. or even 5d. per quart for milk of a 3 per cent or 3·5 per cent quality rather than 3d. or 4d. per quart for a 2·4 per cent or 2·7 per cent milk. Personally I would much rather pay the 4d. or 5d. per quart and water the milk myself, than that it should be watered through the mouth of the cow.

The latter method not only may lessen the maximum yield of fat and solids-not-fat, but it also, being harder or severer on the cow, and thus on her health, endangers the *purity* or safety of the milk. By "purity" I mean freedom from bovine tuberculosis. Some scientists still assure us that bovine tuberculosis may be a source of danger to children; we cannot therefore ignore this responsibility.

If the milk standard were properly upheld, it might for a time reduce the milk "output," but this would soon right itself. It would also undoubtedly force farmers to get rid of their worthless stock. Until this is done it will be absolutely impossible, in fact it would be worse than madness, to encourage any co-operation amongst farmers for the production of fresh butter—that is, on any large scale.

It is almost impossible (for butter-production) to feed a cow for less than £11 to £12 per annum; therefore, taking rent, wages, and other expenses into consideration, a cow producing 260 lb. of butter per annum means a loss to her owner. It is this worthlessness of many of our dairy cows which has brought failure to the creameries which have been started with a view of encouraging co-operation amongst farmers.

Of course I do not suggest that these experiments are final. On the contrary, I publish the results in the hope that the Highland and Agricultural Society, our Agricultural Colleges, and our Board of Agriculture will thoroughly investigate this matter; and this can be done only by the starting of experiments on similar lines.

For a continuation of these experiments I do not recommend the poor ration given in my Experiment II., for it proved too severe upon some of the cows. I would suggest the following as a plan for further experiments. Begin the cows with this rich ration per day:—

15 to 18 lb. long hay.

Hot mash, consisting of the following, prepared several hours before being given to the cows, and served in equal parts, morning and evening:—

4-6 lb. chaff (cut hay and straw in equal parts).

2 " bean-meal.

2 " bran.

2 " bruised oats, with $\frac{1}{2}$ to $\frac{1}{4}$ lb. of treacle.

3 gallons of water, and 1 ounce of salt (and steamed).

4 lb. of bean-meal made into a porridge and steamed, with 3 gallons of water at 70° F. added.

4 lb. of decorticated cotton-cake.

Continue this rich ration for five weeks, then give either of the following poor rations (A and B):—

Poor Ration A.

15 to 18 lb. long hay.

Hot mash—

4-6 lb. chaff (as above).

2 " Indian meal.

2 " bran.

2 " oats.

In 3 gallons of water, 1 ounce of salt (teacup will be unnecessary).

8 lb. of Indian meal in porridge form with 7 gallons of water. (This of course need not be given at one meal.)

Poor Ration B.

15 to 18 lb. long hay.

Hot mash—

4-6 lb. chaff (as above).

2 " bean-meal.

2 " bran.

2 " oats.

In 3 gallons of water, 1 ounce of salt (and no teacup).

40-50 lb. of turnips (say 20 or 25 lb. given at once after each milking).

4 lb. Indian meal in porridge form, with as much water as the cow can be got to take. (This need not be given at one time.)

This poor ration should be given for five weeks, when the rich ration should be restarted.

It will be observed that the rich ration gives to each cow a total of 6 gallons of water, and the poor ration A 10 gallons of water per day, and B, with the water in the turnips, probably considerably more than 10 gallons.

In most feeding experiments particulars are usually omitted in regard to the amount of water consumed each day,—why I do not know, for water seems to me to have a very great influence on the quality of the milk.

I would certainly not recommend any butter-maker undertaking these experiments; he will regret it if he does. Indian meal in three days has a deleterious influence on the flavour and texture of the butter, and overmuch water seems to have the same effect. So much so is this the case, that when feeding the cows 27, 32, 11, 23, and 2 on Ration III., we had to give their milk to the calves and pigs!

Let me here beg that other experiments be undertaken for a year or two, with the view of finding out the feeding necessary to produce the best-flavoured butter at the least possible cost. Different foods—*e.g.*, bean-meal, oats, pea-meal, Indian meal, and cakes—vary greatly in regard to the acidity and flavour developed therefrom. We in this country know very little as to the "influence of food" in regard to flavour and other properties of milk.

When our farmers and owners of pedigree stock have weeded out the worthless stock, when we own cows which will average 300 lb. and more of butter during their lactation period, then

will we be able to encourage creameries and butter-factories. When that day comes the price per lb. will be an average of 1s. or 11d. per lb., and not the more fanciful and limited 1s. 6d. per lb. Hence the necessity that these experiments should be undertaken at once, so that we can prepare ourselves for the future. There is no time to be lost.

Such an industry is worthy of attention. Its success would mean a happier time, a happier life, the possibility of encouraging small holdings, and of thus bringing back to the land some of our people who have settled in towns.

I must add a word of praise to my foreman and his wife, Robert and Mrs Tait, and to my dairymaid, Mary Moreton. These experiments entailed a great amount of care and anxiety on their part. Often they felt this extra work very irksome. It has, however, been accomplished, well done, and cheerfully done, so I am only too pleased to be able to express this my appreciation.

DETAILS OF EXPERIMENTS.

The experiments fall to be divided into three parts—Experiments I., II., and III. They were conducted at Carbeth Dairy-Farm, in the year 1903, beginning in February and ending in August.

The hours of milking at Carbeth Dairy-Farm are 6.30 A.M. and 5 P.M. in winter, and 6 A.M. and 5.30 P.M. in summer.

The milk of every cow at this farm is tested on her 5th and 28th week.

Experiment I.

For Experiment I. two cows, Nos. 13 and 14, were employed. The former commenced milking on the 31st and the latter on 23rd January.

A sample of the mixed (morning) milk of these two cows was taken and tested on 4th February, the result being—

Butter-fat	:	:	:	:	3.35
Solids-not-fat	:	:	:	:	9.7

The following was the food of these cows at this time :—

Per day.

15 to 18 lb. long hay.

Hot mash—

4 lb. chaff (cut hay and straw, equal parts).

2 " bean-meal.

2 " bruised oats.

2 " bran.

3 gallons water, and 2 ounces of salt.

4 lb. decorticated cotton-cake.

Treacle drink. 4 gallons of water.

The hot mash was given night and morning in equal portions. On 5th February the water was increased to 10 gallons.

A sample of the mixed (morning) milk of these two cows was taken on 11th February, the result being—

Butter-fat	.	.	.	.	32
Solids-not-fat	.	.	.	.	88

Thus by the additional water the percentage of butter-fat fell from 3.35 to 3.2, and the *solids-not-fat* from 9.7 to 8.8.

As this seemed to carry out our views as expressed in the article on the Milk Standard in the 'Scottish Farmer' Dairy column, 24th May 1902, to the effect that a salt-and-water treatment can lower the quality of milk, we decided on continuing these experiments. Since I wrote the above letter I have found that cows in a byre can easily be got to take in mash^s and hot drinks 10 gallons of water without the addition of salt.

Mixed milk of cows 13 and 14, 26th and 27th February, gave the following percentages of butter-fat: morning = 2.7; evening = 3.9.

On 3rd March we altered the feeding ration. The hot mash remained the same, but we gave 6 lb. Indian meal instead of 4 lb. decorticated cotton-cake. This feeding ration—relatively poor in albuminoids—we shall now call the "Poor Ration" for Experiment I. (though it is rich compared with the poor ration given in Experiment II)

Cows 13 and 14 were fed on this "Poor Ration" for five weeks, and they were then given a much richer ration. The hot mash still remained the same, but instead of 6 lb. Indian meal we gave 6 lb. decorticated cotton-cake and 6 lb. bean-meal made into a porridge, and *reduced the water from 10 gallons to 6 gallons*. This "Rich Ration" was continued for eight weeks.

EXPERIMENT I.—AVERAGE OF 2 COWS (Nos. 13 and 14).

	Poor Ration					Rich Ration							
	Hay, hot mash, and 6 lb Indian meal, dry matter = 38 lb., albuminoid ratio 1 to 1.5, water—10 gallons					Hay, hot mash, 6 lb. bean meal, and 6 lb. decorticated cotton cake, dry matter 81 lb.; albuminoid ratio 1 to 2.4; water 6 gallons							
	March		April			April				May			
Dates 1902	5 11	12 16	17 20	26 1	28	7 13	16 22	23 29	30 6	7 13	14 20	21 27	24 31
Week of ration	1st	2nd	3rd	4th	5th	1st	2nd	3rd	4th	5th	6th	7th	8th
Yield of milk, lb per week	281	212	198	197	184	173	165	165	156	157	153	149	143
Percentage of butter-fat in same	2.97	2.60	2.00		3.00	3.34	3.27	3.21	3.50	3.25	3.27	3.55	3.52

This table shows that the percentage of butter-fat in the mixed milk of these two cows during the five weeks when 10 gallons of water were given never exceeded the standard, and for four weeks was under it. Immediately after giving a ration richer in albuminoids and *decreasing the water to 6 gallons*, the butter-fat increased and continued much above the standard till in the 7th and 8th weeks of this ration it was over $3\frac{1}{2}$ per cent.

The details for cows 13 and 14 during the last week of the "Poor Ration" and the eight weeks of the "Rich Ration" are given in Table I. (pp. 56, 57).

Experiment II.

Cows Nos. 27, 32, 11, 23, and 2 were treated in the following way.

Every cow after calving was fed for three days on the following ration:—

Ration I. Per day.

15 lb. long hay.
8 " bran.
 $\frac{1}{2}$ " treacle.
3 gallons of water.

The cows then received Ration II., which consisted of—

Ration II.

15 to 18 lb. long hay.

Hot mash—

2 lb. bean-meal.
3 " bruised oats.
2 " bran.
4 " chaff (cut hay and straw, in equal parts).
 $\frac{1}{2}$ " treacle.
3 gallons of water.

2 lb. bean-meal } made into a porridge and given in the forenoon.
2 " bran }
2 " decorticated cotton-cake in the afternoon.
3 gallons of water.

This feeding (Ration II.) was given for fourteen days, and a composite sample of the morning and of the evening milk was taken during the last seven days—*i.e.*, the last week—and tested.

After the completion of this fortnight these cows were fed on the following *poor ration*. *Ration III.*, which consisted of the following, was continued for a month:—

Ration III. Per day.

15 to 18 lb. long hay.
6 lb. bran.
2 " Indian meal.
10 and more gallons of water.
3 ounces of salt.

After the fourth week of Ration III. the feeding was altered to the following rich ration, which was given for eight weeks:—

Ration IV. Per day.

15 to 18 lb. long hay.

Hot mash—

2 lb. bean-meal.

3 " bruised oats.

2 " bran.

4 " chaff.

3 gallons of water.

3 lb. bean-meal.

2 " decorticated cotton-cake.

2 to 4 ounces of salt.

3 gallons of water.

Ration II. gave therefore to each cow 6 gallons of water per day.

" III. " 10 (and more) gallons "

" IV. " 6 gallons "

The appended table gives the average results, and the experimental details for each of the five cows separately are given in Table II. (pp. 57-59).

EXPERIMENT II.—AVERAGE OF 5 COWS (Nos. 27, 32, 11, 23, and 2).

	RATION II. <i>Rich.</i> Dry matter=29 lb.; alb. ratio=1 to 3.4; water=6 gallons.		RATION III. <i>Very poor.</i> Dry matter=21 lb.; albuminoid ratio=1 to 5; water=10 gallons.				RATION IV. <i>Rich.</i> Dry matter=28 lb.; albuminoid ratio=1 to 3.2; water=6 gallons.						
Week of ration .	1st	2nd	1st	2nd	3rd	4th	1st	2nd	3rd	4th	5th	6th	7th
Field of milk, lb. per week .	209	230	230	227	220	202	190	193	197	197	180	200	200
Percentage of butter-fat in same .	..	3.17	3.01	2.87	2.92	2.90	3.27	3.29	3.23	3.30	3.41	3.48	3.48

The above table makes it evident that the mixed milk of these five cows was below the standard in butter-fat or considerably above it, according as they were fed—in fact, that the milk could be watered through the mouths of these cows.

Experiment III.—PASTURE EXPERIMENT.

Experiments Nos. I. and II. gave results so conclusive that we thought we would have no difficulty in getting cows Nos. 12, 38, 4, 8, and 5 used for this experiment, to follow suit. These cows were fed on Rations I. and II., the same as in Ex-

periment II., up till June 8th, when they were put out to grass, and brought in night and morning for milking. We wished these cows to be fed on grass, getting in addition 6 lb. decorticated cotton-cake daily for their rich ration, and 6 lb. Indian meal plus as much water as was possible for their poor ration. We had hoped to get them to take 6 to 8 gallons of water (so much meal and 3 to 4 gallons of water night and morning after each milking). Much to our surprise cow No. 12—the first to be treated on the poor ration—absolutely refused to take the Indian-meal-and-water feeding. In fact, the only way we could make her drink this water was to keep her indoors, when, of course, she took it all right. This, however, was not what we wanted. No doubt had the summer been a dry one we might have got the results we anticipated.

Instead of giving the rich ration after the poor, we reversed the order, because we thought in the previous experiment (No. II.) it would have been less severe on some of the cows had the rich ration preceded the poor. For the rich ration 3 lb. of decorticated cotton-cake were given after each milking, before letting the cows out; and for the poor ration, similarly, 3 lb. of Indian meal in 1 gallon of water after morning and evening milking. The following table shows the average results:—

EXPERIMENT III.—AVERAGE OF 5 COWS (Nos. 12, 38, 4, 8, and 5).

Week of ration	Ration II. as in Experiment II in hyre.		Pasture and 6 lb. decorticated cotton-cake.							Pasture and 6 lb. Indian meal in 2 gallons water.			
	1st	2nd	1st	2nd	3rd	4th	5th	6th	7th	1st	2nd	3rd	4th
Yield of milk, lb. per week	194	210	220	225	231	231	219	209	208	195	185	178	168
Percentage of butter-fat in same	8.33	8.33	8.00	8.19	8.15	8.14	8.21	8.18	8.37	8.06	8.10	8.04	8.07

Cows 38 and 4 only.

On pasture the cows not only had water *ad lib.*, but were this season forced to take, probably, an abnormal amount along with their grass, and, as is shown by above table, the fat-content of their milk was low even when getting 6 lb. decorticated cotton-cake. It slightly decreased when Indian meal was substituted for cotton-cake. The result of this experiment (III.), however, is most interesting, and practically amounts to this, that the quantity and quality of milk from cows fed on grass during a wet season cannot be influenced by the feeding to any great extent. This result confirms my view that it is mainly by

regulating the amount of water consumed by a cow that we can alter the quality of new milk.

The experimental details for each of these five cows separately are given in Table III. (pp. 60-62).

Testing Milk.

Since the 10th November 1901, a seven-days' composite sample (preserved by boracic acid) has every week been taken and tested—that is, each day, morning and evening, a sample of the mixed milk of the whole herd has been taken.

Never once has even the morning milk been below 3 per cent, and it has often been well above that percentage. And the evening seven-days' composite sample usually gives a result .3 per cent higher than the morning seven-days' composite sample.

I have always when testing, or having the tests done by my dairymaids, made the rule which ensures accuracy—viz., that two tests of every sample are taken; when these do not agree, to take another, and so on till two have been got giving identical results. Rarely have we required to take a third test.

The Gerber Test.

Lately we undertook some experiments, in presence of witnesses, to test the reliability of the Gerber butyrometer. From the results of these and other trials I am able to state—without fear of contradiction—that *the Gerber butyrometer is absolutely reliable*. Glassware and the chemicals *must*, of course, *be accurate*, otherwise reliable results cannot be got or expected.

OPINIONS OF WRITERS ON THE INFLUENCE OF FOOD ON MILK.

Professor Farrington and Wolf's 'Testing of Milk and its Products.'

P. 143 : 170. *Influence of heavy grain-feeding on the quality of milk.*—If cows are not starved or underfed, an increase in the feeding ration will not materially change the richness of the milk produced, as has been shown by careful feeding experiments conducted under a great variety of conditions and in many countries. Cows that are fairly well fed will almost invariably give more milk when their rations are increased; but the milk will remain of about the same quality after the first few days are passed as before this time, provided the cows are in good health and under normal conditions. Any change in the feed of cows will usually bring about an "immediate" change in the fat-content of the milk, as a rule increasing it to some extent; but in the course of a few days, when the cows have become accustomed to their new feed, the fat-content of the milk will again return to its normal amount.

P. 145 : 173. The increase which has often been observed in the amount

of butter produced by a cow, as a result of a change in feed, doubtless, as a rule, comes from the fact that more, but not richer, milk is produced. The quality of milk which a cow produces is as natural to her as is the colour of her hair, and is not materially changed by any special system of normal feeding.

174. *Method of improving the quality of milk.*—The quality of the milk produced by a herd can generally be improved by selection and breeding—*i.e.*, by disposing of the cows giving poor milk, say below 3 per cent of fat, and by breeding to pure-bred or high-grade bulls of a strain that is known to produce rich milk. This method cannot work wonders in a day, or even in a year, but it is the only certain way we have to improve the quality of the milk produced by our cows.

It may be well in this connection to call attention to the fact that the quality of the milk which a cow produces is only one side of the question; the quantity is another, and an equally important one. Much less dissatisfaction and grumbling about low tests among patrons of creameries and cheese-factories would arise if this fact was more generally kept in mind. A cow giving 3 per cent milk should not be condemned because her milk does not test 5 per cent; she may give twice as much milk per day as a 5 per cent cow, and will therefore produce considerably more butter-fat. The point whether or not a cow is a persistent milker is also of primary importance; a production of 300 lb. of butter-fat during a whole period of lactation is a rather high dairy standard, but one reached by many herds, even as the average for all mature cows in the herd. It should be remembered that a high production of butter-fat in the course of the whole period of lactation is of more importance than a very high test.

Mr Henry Thomson, M.R.C.V.S., of Aspatria, Letter to 'North British Agriculturist,' 3rd September 1902.

There is an old saying that "milk and butter from the coo" goes in at the "moo." It must be admitted that judicious feeding and blending of foods has a great effect on the milk and butter productions; but, again, there is also a very great difference in the animals as well for yielding both quantity and quality of milk. From some cows, feed how you may, the cream that rises on the top of the milk after standing twenty-four hours is scarcely as thick as the newly-drawn milk from a good butter cow. Therefore, for a heavy yield of milk and butter, both cow and feeding require selection and attention.

'The Book of the Dairy,' by Fleischmann. Translated by Messrs Aikman and Wright.

P. 41: How far the treatment with food in order to increase the yield and profit can be developed, has up to the present been but little investigated. Perhaps the limits are less narrow than we are just now inclined to assume, &c.

P. 48: It is well known that milk may be watered through the animal body, either intentionally or unintentionally. The more the custom of buying milk according to composition prevails, the more rarely will this kind of adulteration take place.

'Milk and its Products,' by Henry H. Wing. Edited by L. H. Bailey.

P. 30: The food has also a considerable influence upon the quality of the milk, although the quantity of the milk is more easily affected by changes in the amount and character of the food than is quality. In fact, with cows kept under favourable conditions, with an abundant supply of food, it is hardly possible to increase the proportion of fat to other solids by a change in the food. On the other hand, while the amount of the various constituents of the milk is not easily affected by

food, the quality of the constituents themselves may be considerably influenced, notably in the case of the fat.

'The Dairy Farm in Australia. A Practical Guide,' &c. 1901.

Pp. 124, 125 : A small quantity, say of 2 lb. per day, mixed with other food, will cause the milk-yield to be very largely increased, and will also make the milk much richer than it would otherwise be.

P. 125 : The importance of food for dairy-cattle cannot be too strongly emphasised. If the proper food is not given the milk-supply will inevitably suffer. The only way in which a large yield of rich milk can be obtained is by the use of food rich in oil and albuminoids.

Dr Robert Hutchison's 'Food and the Principles of Dietetics.'

P. 420 : *Influence of the mother's diet on the composition of her milk.*—They found that, on the whole, fat was the only ingredient of the milk on which the diet produced any appreciable effect. It was increased, sometimes rising one per cent on the first and second diets only.

An abundant supply of carbohydrates had no influence upon the amount of fat. Nor, curiously enough, had the amount of fat consumed in the food ; indeed, an increased amount of fat eaten seems to diminish rather than increase the amount of cream in the milk. These results are in harmony with those obtained in the feeding of cows, where a bean diet produces more and richer milk than any other, and the amount of fat in food is without effect. It is surprising, too, that an increased amount of fluid in the diet does not appreciably increase the total yield of milk. Nor did the diet of salted foods affect the composition of the milk or the health of the child.

Acidity in Milk.

The kind of food given to cows has undoubtedly a marked influence on the quality of butter produced, and some rations seem to produce milk which contains a higher percentage of acid (determined immediately after milking) than do other rations. It may not, however, be generally known that, though the percentage of acidity in new milk from different cows varies, the acidity in the milk of an individual cow while consuming the same food seems to be fairly constant, as is the case with solids-not-fat and butter-fat.

It is not for me to say what this acid is or how it is formed, whether it be due to the presence of acid phosphates, carbonic acid gas, or some organic acid. It may be, however, that this acidity encourages bacteria favourable for the butter-maker, and he may find it advisable to keep such cows in his herd as yield a high percentage of acidity. The milk-producer may find it worth his while to do the opposite, because from .2025 to .207 per cent of acid is supposed to be the limit at which it is safe to pasteurise milk. Heat applied to milk of a higher acidity seems to damage the flavour.

In the appended table observe how the milk of certain cows (Nos. 19 and 6), and *at once after milking*, is dangerously near this limit. Observe also how the acidity in different milkings of each individual cow varies very little from her mean percentage.

PERCENTAGE ACIDITY (STATED AS LACTIC ACID) DETERMINED IMMEDIATELY AFTER MILKING.

Cow's No.	Date of calving. 1903.	1904.												Mean.
		Jan. 5.	Jan. 7.	Jan. 8.		Jan. 9.		Jan. 11.		Jan. 12.				
				P.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.			
12	May 4	.137	.147	.144	.146	.142	.142	.140	.142	.135	.140	.142	.142	
19	Sept. 23	.180	.198	.203	.191	.194	.194	.194	.185	.189	.187	.185	.191	
22*	Jan. 28	.160	.160	.153	.153	.153	.153	.153	.158	.163	.158	.158	.156	
8	May 20	.140	.149	.153	.155	.147	.153	.155	.158	.158	.155	.155	.153	
7	Oct. 25	.167	.178	.176	.171	.169	.173	.178	.171	.169	.158	.169	.171	
6	Dec. 12	.185	.187	.191	.189	.189	.196	.191	.189	.194	.185	.194	.190	
Average for above 6 cows.	Time from completion of milking to end of test, minutes . . . Temperature of milk at end of test, F. . .	9	12	12	12	11	7	6	11	9	7	9	9½	
		82°	82	87°	83°	90°	90°	90	85°	89°	90°	87°		
For "whole milk," an average of 20 cows.	Acidity per cent and cooling.	...	...	..	...	.155	...	.158	...	.149	...	.154	
		...	...	...	...	83°	...	79	...	84°	...	82	
After aeration Before separation and cooling.	Acidity per cent and cooling.	...	...	...	.167	...	.164	...	.160	...	.160	.163	
		...	...	...	68°	...	57°	...	53°	...	56°	58	

* Thus cow had not held to service and hence was in milk.

One word in regard to this acidity test. Full particulars of this test is given in Farrington and Woll's 'Testing of Milk and its Products.'

I would here recommend that every student in butter-making be taught and made to use this most practical test before each churning, so that before they leave the college they will have learned its value. This method of testing cream is far superior to any such method as the judging by appearance, smell, or taste, or litmus paper.

I lately sent two lots of milk from Bath to Glasgow for bacteriological examination and testing for acidity percentage. Before despatching I took the acidity of both lots.

The 1st gave '1620 per cent acidity.

" 2nd " '1665 to '171 "

The Glasgow report gave—

1st lot '164 per cent acidity.

2nd " '171 " "

This, I think, shows the accuracy of this test.

MILK TABLES.

TABLE I.—EXPERIMENT I.

COW No. 13.	Average body temperature for seven days, °F		Milk yielded during these seven days, lb			Percentage of butter fat in same	
	min	max	A	M	Total	A	P.M
<i>Poor Ration.</i>							
Last week, April 2-8	54	61	116	103	219	2.25	3.4
<i>Rich Ration.</i>							
April 9 to June 3.							
1st week	57	62	112	95	207	2.8	3.75
2nd "	55	63	102	87	189	3.15	3.6
3rd "	54	59	94	86	180	3.1	3.4
4th "	53	60	95	83	178	3.3	3.9
5th "	55	60	95	80	175	2.9	3.7
6th "	54	60	95	82	177	3.05	3.35
7th "	58	64	95	82	177	3.35	3.9
8th "	62	67	89	80	169	3.3	3.7

TABLE I.—EXPERIMENT I.—*continued*.

COW No. 14.	Average body temperature for seven days, F.		Milk yielded during these seven days, lb.			Percentage of butter-fat in same	
	min.	max.	A.M.	P.M.	Total.	A.M.	P.M.
<i>Poor Ration.</i>							
Last week, April 2-8	54	61	76	73	149	2.55	3.8
<i>Rich Ration.</i>							
April 9 to June 3.							
1st week	57	62	79	72	151	3	3.8
2nd "	55	63	77	65	142	3	3.35
3rd "	54	59	78	69	147	3.15	3.2
4th "	53	60	70	64	134	3.2	3.6
5th "	55	60	73	66	139	3.1	3.3
6th "	50	60	68	61	129	3.5	3.2
7th "	58	64	67	54	121	3.55	3.4
8th "	62	67	63	55	118	3.4	3.7

TABLE II.—EXPERIMENT II.

COW No. 27.	Average body temperature for seven days, °F.		Milk yielded during these seven days, lb.			Percentage of butter-fat in same.	
	min.	max.	A.M.	P.M.	Total.	A.M.	P.M.
Calved 27th February.							
<i>Ration II.</i>							
1st and 2nd weeks. Two days milk taken, 4th and 5th March . . .	...	...	...	...	...	3.1	3.8
<i>Ration III.</i>							
March 5 to April 1.							
1st week . . . . .	...	...	122	97	219	2.7	3.5
2nd " . . . . .	...	...	126	94	220	2.65	3.5
3rd " . . . . .	...	...	121	113	234	2.35	3.1
4th " . . . . .	...	...	122	110	232	2.6	3.1
<i>Ration IV.</i>							
March 6 to May 31.							
1st week	55.71	62.43	113	90	212	3.2	3.4
2nd "	57.43	62.57	114	106	220	2.8	3.25
3rd "	54.43	61.71	119	111	230	2.6	3.2
4th "	53.71	58.85	100	102	211	2.8	3.35
5th "	55.71	61.43	105	96	201	2.72	3.3
6th "	54.43	60.00	103	93	196	2.9	3.2
7th "	53.85	61.71	109	99	208	2.8	3
8th "	63.28	65.66	92	85	177	3.05	3.2

TABLE II.—EXPERIMENT II.—*continued*.

COW No. 32. Calved on March 19.	Average body temperature for seven days, °F.		Milk yielded during these seven days, lb			Percentage of butter-fat in same	
	min	max.	A. M.	P. M.	Total	A. M.	P. M.
<i>Ration II.</i>							
March 27 to April 9.							
1st week . . .	...	...	101	80	181	...	...
2nd " . . .	55 00	62.42	112	102	214	2.9	3.8
<i>Ration III.</i>							
April 10 to May 7.							
1st week . . .	57.57	63	118	106	224	2.8	3.2
2nd " . . .	55.28	62	119	105	224	2.6	2.9
3rd " . . .	54.85	59.14	114	103	217	2.5	2.9
4th " . . .	54	60.85	103	89	192	2.5	3.05
<i>Ration IV.</i>							
May 5 to July 2.							
1st week . . .	55.42	60.14	94	91	185	2.8	3.6
2nd " . . .	53.85	60.57	95	93	188	3	3.05
3rd " . . .	60.28	65.85	104	96	200	3.05	3.4
4th " . . .	61.85	67.71	105	95	200	3.2	3.3
5th " . . .	61.28	70.71	93	86	179	3.1	3.4
6th " . . .	52.57	58.28	89	93	182	3.15	3.65
7th " . . .	55.85	63.72	96	86	182	3	3.3
8th " . . .	58.57	65.42	97	92	189	3	3.5
COW No. 11.							
Calved on March 20.							
<i>Ration II.</i>							
March 27 to April 9.							
1st week . . .	...	...	124	100	224	...	...
2nd " . . .	55	62.57	128	118	246	3.09	3.75
<i>Ration III.</i>							
April 10 to May 7.							
1st week . . .	57.52	63	127	118	245	2.5	3.05
2nd " . . .	55.14	62	122	109	231	2.5	2.8
3rd " . . .	54.85	59.14	115	105	220	2.55	2.95
4th " . . .	54	60.85	110	93	203	2.6	2.85
<i>Ration IV.</i>							
May 8 to July 2							
1st week . . .	53.42	60.14	97	87	184	3	3.3
2nd " . . .	53.85	60.57	99	91	190	3	3.3
3rd " . . .	60.14	65.85	105	95	200	3	3.25
4th " . . .	61.85	67.71	106	94	200	3.25	3.3
5th " . . .	61.28	70.71	95	96	191	3.15	3.5
6th " . . .	52.57	58.28	111	100	211	3.45	3.45
7th " . . .	55.85	63.71	110	105	215	2.9	4.5
8th " . . .	58.57	65.42	100	94	194	3.5	3.85

TABLE II.—EXPERIMENT II.—*continued*.

COW No. 23. Calved on March 28.	Average body temperature for seven days, °F.		Milk yielded during these seven days, lb			Percentage of butter-fat in same.	
	min.	max.	A.M.	P.M.	Total.	A.M.	P.M.
<i>Ration II.</i>							
April 2 to April 15.							
1st week . . .	54.42	61.57	106	97	203	...	...
2nd " . . .	57.42	62.85	112	102	214	3.6	4.3
<i>Ration III.</i>							
April 16 to May 13.							
1st week . . .	56.14	63	115	106	221	2.9	3.6
2nd " . . .	54.71	59.42	108	101	209	2.75	3.3
3rd " . . .	53.85	60.42	102	86	188	3.1	3.5
4th " . . .	55.42	60.28	80	80	169	3.3	3.5
<i>Ration IV.</i>							
May 14 to July 8.							
1st week . . .	54	60.28	89	83	172	3.4	3.45
2nd " . . .	58.57	64.71	94	81	175	3.5	3.9
3rd " . . .	62.28	67.28	84	75	159	3.5	3.8
4th " . . .	62	71.14	89	84	173	3.6	3.8
5th " . . .	52.85	59.42	81	82	163	3.85	4.4
6th " . . .	56.28	63.57	96	86	182	3.9	4.35
7th " . . .	58.57	65.14	89	86	175	4	4.15
8th " . . .	53.57	67.85	83	82	165	4.5	4.3
<hr/>							
COW No. 2.							
Calved on March 28.							
<i>Ration II.</i>							
April 2 to April 15.							
1st week . . .	54.43	61.57	119	109	228	...	...
2nd " . . .	57.43	62.85	130	116	246	2.85	3.55
<i>Ration III.</i>							
April 16 to May 13.							
1st week . . .	56.14	63	133	112	242	2.7	3.15
2nd " . . .	54.71	59.43	129	120	249	2.65	3
3rd " . . .	54.14	60.43	125	116	241	2.9	3.3
4th " . . .	55.43	60.28	112	102	214	2.95	3.4
<i>Ration IV.</i>							
May 14 to July 8.							
1st week . . .	53.28	60.28	101	96	197	3	3.5
2nd " . . .	58.14	64.71	106	88	194	3.3	3.8
3rd " . . .	62.28	67.28	101	96	197	2.9	3.6
4th " . . .	62	71.14	104	98	202	3.05	3.35
5th " . . .	52.85	59.43	106	103	209	3.2	3.45
6th " . . .	56.28	64	121	110	231	3.2	3.5
7th " . . .	58.57	65.14	114	107	221	3.25	3.9
8th " . . .	53.57	67.85	116	109	225	3.35	3.6

TABLE III.—EXPERIMENT III.

COW No. 12. Calved on May 4.	Average byre temperature for seven days, ° F.		Milk yielded during these seven days, lb.			Percentage of butter-fat in same.	
	min.	max.	A.M.	P.M.	Total.	A.M.	P.M.
<i>Ration II.</i>							
May 9 to May 23.							
1st week	55.14	59.85	117	94	211	...	...
2nd "	53.71	61.28	106	99	205	3.9	4
<i>Ration IV.</i>							
May 23 to July 3.							
1st week	61.00	65.85	118	107	225	3.4	3.7
2nd "	62.57	69.14	127	115	242	3.1	3.4
3rd "	60.57	69.28	126	114	240	3.2	3.3
4th "	51.85	57.57	143	127	270	3.1	3.2
5th "	57.28	64.85	141	126	267	2.9	3.6
6th "	57.14	65.00	127	121	248	2.9	3.4
<i>Ration III.</i>							
July 8 to August 4.							
1st week	54.14	67.71	118	120	238	2.95	3.2
2nd "	55.28	64.57	115	115	230	2.95	3.05
3rd "	59.43	67.00	115	109	224	2.8	3.2
4th "	57.28	67.28	109	101	210	2.8	3
<i>COW No. 38.</i>							
Calved on April 27.							
<i>Ration II.</i>							
May 18 to May 31.							
1st week . . . . .	...	...	101	78	179	...	...
2nd "	58	65.57	98	75	173	3	3.3
<i>Ration IV.</i>							
June 1 to July 19.							
1st week	64.85	67.43	110	91	201	2.8	3.65
2nd "	65.43	66.85	105	89	194	3.1	3.65
3rd "	56	57.43	124	104	228	2.85	3.6
4th "	54.43	60.28	120	100	220	2.8	3.65
5th "	55.50	60.83	117	97	214	2.7	3.5
6th "	57.71	66.57	115	102	217	2.85	3.35
7th "	56.28	61.43	120	100	220	2.9	3.55
<i>Ration III.</i>							
July 20 to August 16.							
1st week	56.57	64	108	83	191	2.6	3.4
2nd "	59.71	62.57	104	80	184	2.65	3.35
3rd "	61.71	63.57	104	73	177	2.4	3.05
4th "	55.43	61.71	98	73	171	2.6	3.2

TABLE III.—EXPERIMENT III.—*continued.*

COW No. 4. Calved on May 5.	Average body temperature for seven days, F		Milk yielded during these seven days, lb			Percentage of butter-fat in same	
	min	max.	A.M.	P.M.	Total	A.M.	P.M.
<i>Ration II.</i> May 17 to May 30.	...	...	102	75	177	...	...
1st week	58.50	65.66	107	86	193	3	3.5
2nd "							
<i>Ration IV.</i> May 31 to July 18.							
1st week	62.71	66.71	132	103	235	2.75	3.5
2nd "	66.85	68	125	89	214	3	3.7
3rd "	56	57.21	125	104	229	2.7	3.8
4th "	55.57	60.28	129	95	224	2.95	3.7
5th "	55.50	60.83	120	90	210	3.05	3.8
6th "	56.57	66.28	111	93	204	2.85	4.05
7th "	57.71	61.71	108	88	196	3.15	3.9
<i>Ration III</i> July 19 to August 15.							
1st week	55.14	63.14	98	86	184	2.6	3.7
2nd "	59.14	62.85	90	73	163	3.3	3.7
3rd "	61.71	63.57	92	70	162	2.9	3.5
4th "	56	62.28	85	63	148	2.85	3.65
COW No. 8. Calved on May 20.							
<i>Ration II.</i> May 25 to June 7.							
1st week	58	65.57	116	85	201	...	...
2nd "	64.85	67.43	134	114	251	3.05	3.25
<i>Ration IV.</i> June 8 to July 19							
1st week	65.43	66.85	133	111	244	2.7	3.6
2nd "	56	57.43	149	111	260	2.7	3.6
3rd "	54.43	60.28	140	107	247	2.6	3.5
4th "	55.5	60.83	142	108	250	2.5	3.25
5th "	57.71	66.57	115	105	220	3.05	3.7
6th "	56.28	61.43	117	89	206	2.65	3.4
<i>Ration III.</i> July 20 to August 16.							
1st week	56.57	64	115	84	199	2.6	3.5
2nd "	59.71	62.57	109	77	186	2.5	3.4
3rd "	61.71	63.57	108	67	175	2.4	2.9
4th "	55.43	61.71	105	66	171	2.7	3

TABLE III.—EXPERIMENT III.—*continued*.

COW No. 5. Calved on May 25.	Average body temperature for seven days, °F		Milk yielded during these seven days, lb			Percentage of butter-fat in same.	
	min	max	A.M.	P.M.	Total.	A.M.	P.M.
<i>Ration II.</i>							
May 30 to June 12.							
1st week . . .	62·71	66·71	107	93	200	...	...
2nd " . . .	66·85	69·43	128	100	228	3	3·3
<i>Ration IV.</i>							
June 13 to July 24.							
1st week . . .	56·85	57·71	124	116	240	2·1	3·7
2nd " . . .	55	60	115	99	214	2·5	*4 65
3rd " . . .	55·16	60·33	116	94	210	*3·15	3·8
4th " . . .	56·57	65·85	103	89	192	2·4	3·8
5th " . . .	57·43	62	95	88	183	2·1	3·7
6th " . . .	55·71	63·43	92	80	172	2·55	3·3
<i>Ration III.</i>							
July 25 to August 21.							
1st week . . .	58·28	62·85	92	71	163	2·5	3·5
2nd " . . .	62·28	63·43	88	73	161	2·3	3·8
3rd " . . .	56·71	62·71	86	65	151	2·6	3·6
4th " . . .	59·14	62	82	59	141	2·45	3·4

* Test unreliable owing to accident, and not taken into average tables

POULTRY-KEEPING FOR FARMERS.

By ALEX. M. PRAIN, Longforgan, Perthshire.

It is usual to preface any remarks on poultry-keeping by showing what an enormous importation there is in poultry and eggs from foreign countries. The figures have been so often printed that it is a wonder the farmers and cottagers in this country are not getting convinced that this industry is worth inquiring into. When one considers that, besides the hundreds of tons of dead poultry sent into this country, over fifty eggs are imported for every individual, the demand for these commodities must be enormous. The home producer ought to have every advantage, as most of the foreign dead poultry must come in frozen, and the eggs cannot be placed on the consumer's table

as quickly as those produced at home. We have thus the fact that home-grown poultry and eggs should be the best, and fetch the best prices.

Neglect of Poultry-Rearing.

How is it that hitherto we have scarcely made any effort to supply this practically inexhaustible demand? The reason is chiefly that farmers of all classes have been accustomed to look to other farm commodities to pay the rent and keep things going. Grain-growing, cattle-rearing and -feeding, dairying, and other branches of farming have been relied on to keep the wolf from the door, and farmers are slow to realise that the profits from these industries have gradually been diminishing, and that other sources of income must be looked out for. Now poultry can hardly be expected to pay all the rent, but with a little attention they can be made to leave a very considerable profit.

Foreign competition in grain must seriously affect farmers' profits, because the foreign grain can be landed as good as, and in some cases better than, the home product; but in poultry and eggs there is the satisfaction that we can produce the best, and get in consequence the best prices.

In recent years there are signs that much greater interest is being taken in the poultry department of farming. Under county councils poultry-keeping has been recognised as a technical subject, and lectures have been given all over the country. Notably in England and Ireland has this been the case. Some county councils have employed a lecturer not only to give lectures but to visit the various districts and tell the people the best breeds to keep, the best methods of housing and feeding; and immense good has been done by such practical instruction. In England are the headquarters of the National Poultry Organisation Society, with depots in different centres collecting and distributing eggs. There is also the Utility Poultry Club, which conducts laying competitions, and encourages in every way the breeding of the best utility fowls. In this way much is being accomplished, but a great deal still remains, and this must be done largely by individual energy.

Indifference of Farmers.

In lecturing through the country, the greatest difficulty I have to face is the indifference of the farmers generally. Poultry are considered too trivial a matter to bother about, and it is rare to find an intelligent interest taken in them. The stock is usually a mixture of a great many different breeds, and

a considerable number too old to give an adequate return for their keep.

The birds all roost in one house, usually in a bad exposure, without light, deficient in ventilation, and very dirty. Now why should the poultry not have as much intelligent interest taken in them as the other classes of farm stock? If this were so, I am convinced they would leave the greatest percentage of profit.

Easy Method of Improving Poultry.

A very easy way to improve an ordinary stock of poultry is to use only pure-bred cocks. These can be bought for 7s. 6d. to 10s. each. I know one farmer who spent £1, 10s. in this



FIG. 6 *Mongrel.*

way, and his poultry returns for that year showed an increase of £20. Of course this is only fencing with the subject, as I am convinced that the best results will be obtained from pure breeds or first crosses. According to a great authority, "Mongrels are indifferent layers, and poor table fowls."

In breeding poultry, as in breeding other kinds of farm stock, it is necessary to have a definite end in view. One great factor to success is to ascertain whether the production of eggs or the production of table poultry will pay best; then choose one or the other, and breed accordingly. The choice will depend on the wants of the district, nearness to suitable markets, climate, and situation of the farm.

Varieties for Egg-Production.

If egg-production will pay best, then by all means choose one or other of the breeds specially suited for that purpose. Minorcas (fig 6), Leghorns (fig. 7), and Andalusians are splendid layers in a suitable climate, and never go "broody," but they are rather indifferent table fowls. Where the climate is cold or wet, and shelter wanting, a first cross between a brown or white Leghorn cock and buff Orpington hens will give excellent egg-production.

Fig 7 — *White Leghorns.**Table Fowls.*

When table fowls are wanted, such breeds as Dorkings (fig. 8), buff Orpingtons, Plymouth Rocks, or Faverolles must be chosen, and if these are crossed with an Indian Game (fig 9) or Old English Game cock, the very best table chickens are produced. These crosses are very easily reared, and are ready for killing when three months old.

Fig 8 — *Dorkings**General Purpose Fowls.*

Generally speaking, a breed suitable for both egg-production and table purposes combined is wanted, and the best breeds for both purposes are buff Orpingtons (fig. 10), Plymouth Rocks (fig 11), Langshans, Wyandottes, and Faverolles.

Whatever the situation of the farm may be, there is some breed of poultry suitable for it, and if not of poultry, then of ducks or geese.

Pure Breeds or First Crosses.

I cannot emphasise too strongly the advantages of keeping only pure breeds or first crosses. Some farmers make a practice

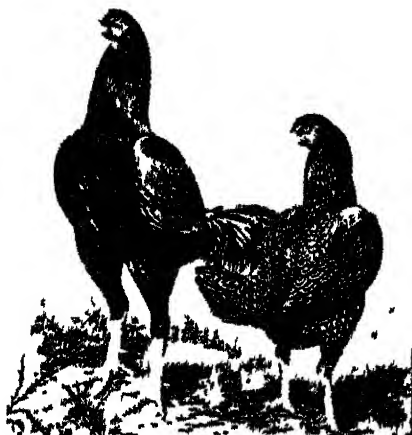


Fig. 9.—*Indian Game.*

of introducing two or three pure stock cocks every year, but always choosing a different breed. One year it may be a non-sitting breed, such as Leghorns or Minorcas; next year it may be a breed purely for table purposes, such as Indian Game, and so on. Now this seems perfect folly, as no principle is followed, and neither the best layers nor the best table fowls are produced. By using the same pure breed every year the stock would soon improve as layers or table

fowls, according to the breed used; but indiscriminate mixing up of breeds is a great mistake.

Let me mention one or two advantages of keeping only pure-

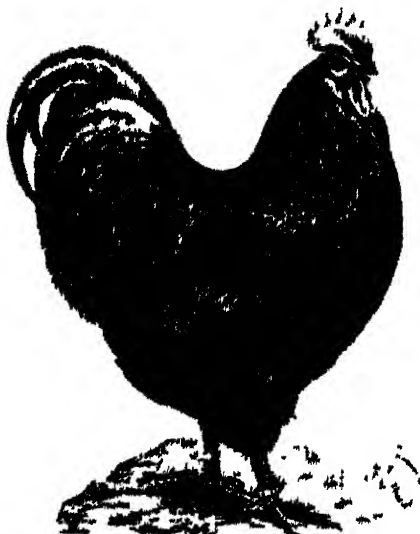


Fig 10 — *Orpington.*

bred stock. To begin with, they cost no more to rear, and eat no more food, than mongrels. Then a much higher price can be got for any surplus stock to be marketed. For good, healthy, well-grown pure cockerels at least 5s. each can be obtained for stock purposes—just double the poulterer's price; then the pure pullets are worth at least 3s. 6d. to 4s. each for laying purposes. Another consideration is, that when eggs are cheap commercially in the spring, a good number of sittings of pure eggs can always be sold at a minimum price of 2s. 6d. per sitting; and for marketing the eggs are of a uniform shape and colour, which always help the price. I know several

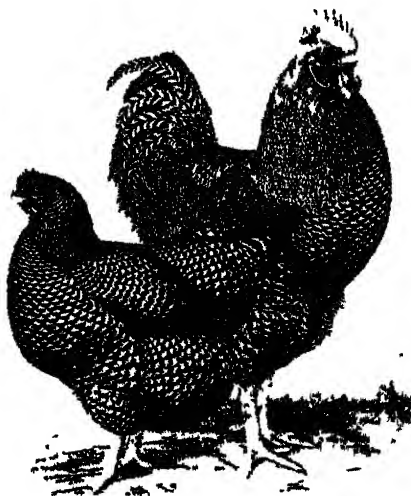


Fig. 11.—*Plymouth Rocks*

instances where this plan is adopted with great advantage. Above all, with a little judicious selection, there is always the chance of producing good show specimens, and these are worth anything from £1 up to £20, and even £100 has been paid.

Poultry on Small Holdings.

Small holdings, crofts, dairy-farms, and market-gardens are best of all adapted for poultry-keeping, and fowls should on all these, and on all larger farms as well, be a paying adjunct to the regular stock of the farm. Many cottagers with only a small garden make a considerable addition to their income by keeping a pen of pure fowls. I could give instances where as much as £20, £30, and £50 has been offered for a choice of a few of each year's young stock; and I have heard £40 refused by a working man for half a dozen bantams. These of course are fancy prices given for show birds; but they are always to be had if the stock is good enough. And what better or more profitable hobby could a cottager have?

The chief reason of the large number of eggs exported from France is that every cottager and small farmer keeps fowls, the surplus eggs being regularly collected by dealers and sent to this country. This is so well organised that eggs are in the

London markets within four days. There are no large poultry-farms in France, but, as I have said, every small holding and cottage has its flock, and these are counted on to help the income.

How to improve Poultry-Rearing.

Now the question comes to be asked, How are we to improve our home production of poultry and eggs? It must be answered on these lines: First, *Improvement of the breeds kept*; second, *Better management*; third, *More system and care in marketing*.

As to *improvement of breeds*, I have already stated that the best results will be got from pure breeds or first crosses. There is supposed to be a great difficulty in starting a pure flock, but this can be easily done in two or three different ways. After having fixed whether egg-production or table poultry is to be the end aimed at, and having chosen the breed best adapted to the situation and climate, a few sittings of eggs can be bought from a reliable breeder: in the autumn all the old stock should be cleared off, and a start is thus made at once. Another and better way is to buy, say, six hens and a cock, put them in a wooden house away from the rest of the fowls, set all the eggs from this pen only, and clear off all the old stock in the autumn. This is the best and most profitable way. There is no difficulty about keeping a pen of birds separate: all that is wanted is a piece of wire-netting and a movable wooden house, the total cost not being more than £3 or £4.

Now as to *management*. This is by far the most important and most neglected part of poultry-keeping. Let me say at once that the almost universal method of keeping all the birds in one henhouse is fatal to the best results being obtained. The generality of henhouses are badly constructed, and have nearly always an unfavourable exposure. There is no proper ventilation, the perches are arranged sloping up to the roof, and as the birds naturally seek the highest perch, there is overcrowding and consequently disease. Where it is only possible to keep hens in one place the number should be rather under than over the capacity of the house, allowing about 2 square feet of floor space to each bird. The perches should be arranged on a level about 2 feet from the floor and 18 inches apart, while great attention should be paid to cleanliness and ventilation.

The best results, however, are obtained when the birds are split up into small colonies and scattered over the farm. This of course entails a little initial expense for housing, but that will very soon repay itself. No one can have travelled through England without having seen hundreds of these movable wooden houses all over the fields, beside hedges, and near any shelter. These houses are of a great many different shapes, mostly, how-

ever, on wheels so as to be easily moved (fig. 12). The floor of these is raised about 18 inches from the ground to provide a shelter from the sun and rain. Another kind of house commonly used, and perhaps the most suitable, is made wide at the ground and tapering to the apex (fig. 13). These are fitted with handles at each side for moving, and being hinged at the top, can be taken down and packed flat for transport. A house of this description 10 feet long can hold twenty to twenty-five birds, and costs about £3.

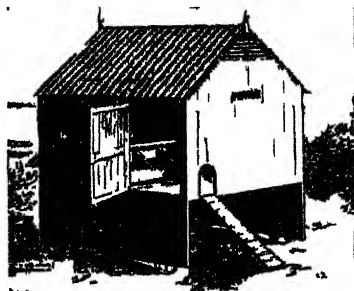


Fig 12.—*Movable house*

It is when birds are separated into such houses in small colonies, and scattered over the farm, that the best results are obtained. On many farms in England these movable houses are dotted all over the grass-fields, perhaps twenty birds to the acre; and kept this way a considerable profit is assured. During spring and summer the land is simply teeming with insect life, and this forms a large portion of the fowls' food.

I have kept birds in perfect health in this way on one feed of

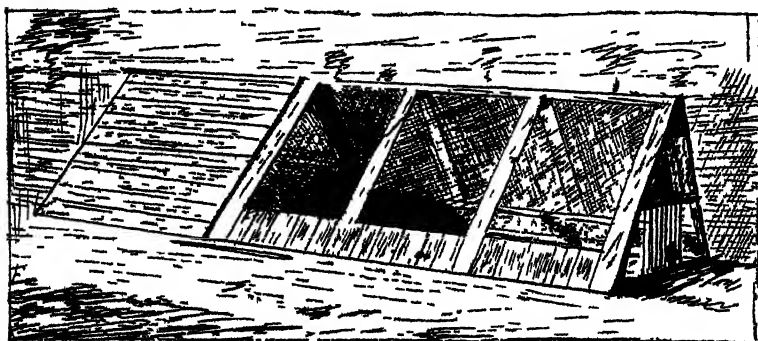


Fig. 13 — *Movable poultry-house (folding)*

grain and water daily. The chickens from stock so kept are strong and no trouble to rear. Then consider the waste of food on the stubble-fields after harvest; this food is consumed by wild birds of all kinds instead of by the fowls. With these movable houses on the stubbles, birds only require water, the whole food they find for themselves, and, costing nothing to keep, they are surely bound to pay. Birds on grass-fields cer-

tainly eat some grass, but against this is the number of slugs and insects destroyed, and the value of the manure. This last item is often entirely disregarded, but analysis proves it to be rich in ammonia. Dr Voelcker estimated the value of the moist droppings at £2 per ton, and when partially dried at £4, 4s. per ton.

Feeding Poultry.

In considering the question of feeding, birds on a farm are more often overfed than underfed. Overfeeding lessens egg-production and induces disease. Unsuitable food is also often given, Indian corn being frequently used to excess. For laying stock even in winter this should be sparingly used, and in summer discontinued altogether. The best system of feeding is to give a hot meal of soft food in the morning and a diet of hard grain before roosting. Soft food should always be cooked or mixed with boiling water, and for preparing this it is useful to have a stock-pot, into which all scraps, such as pieces of bread, potato-peelings, meat-bones, vegetables, &c., can be put. This, left to simmer all night beside the fire or on a paraffin-stove, only requires to be brought to boiling-point when needed for mixing with the meals in the morning.

In winter the best meals are Indian or pea meal, bran and barley-meal, with middlings or fine thirds; and a mixture of 1 part Indian meal, 1 part barley-meal, and 1 part middlings, with the contents of the stock-pot, which ought always to contain vegetables of some sort, or turnips, makes a most appetising diet. With this wheat and barley should be given alternately for the afternoon feed.

For summer feeding the mixture should be 1 part barley-meal to 2 parts middlings, and for afternoon wheat and oats alternately. Meals should never be mixed with cold water, as it is most difficult to digest. Rather than mix meals with cold water it is better to use hard grain only. Great care should be taken that every diet is cleanly eaten up and none left over.

Marketing.

The next important point is the marketing of surplus produce, and it is most essential to see that all surplus produce is put on the market at the right time. It is well known that the price of eggs from October till March is about double what it is for the rest of the year, therefore as many eggs should be produced in these months as possible. Again, there is always a good price for spring chickens, 2s. 6d. to 3s. each being quite common, and no more would be got by keeping the same birds

on till Christmas. Then there is a right time to sell old hens. These should never be kept after they are twenty-seven months old—that is, they should be sold between July and August before the game season commences, and before they drop into their second moult. After a hen is two years old every moult takes longer, and the number of eggs she lays decreases. Attention to such details of marketing makes all the difference to the profits.

Winter Laying.

At first sight it may seem difficult to get hens to lay between October and March, but it is really not so. First of all, select winter-laying breeds, such as Orpingtons, Plymouth Rocks, Wyandottes, Langshans, or Faverolles, and hatch a good number of chickens between the middle of February and the end of April. Given reasonable shelter and suitable food, the pullets will be laying by October.

I have often wondered why the covered cattle-courts at most farms have not been more taken advantage of for this purpose. The cockerels should be separated as soon as their sex is known, given extra food, and sold as spring chickens. If another lot of chickens is hatched in July or August, and put out on the stubbles after harvest, they will at very little cost be ready for the Christmas market.

Early Chickens.

Another difficulty may appear to some—namely, to get February chickens when there are no “broody” hens. Hens are now, however, no longer necessary for hatching purposes, as incubators and rearers have taken their place, and do the work as well (fig. 14).

There is still, however, a considerable amount of prejudice against incubators, probably because they have never been seen properly at work. They are now long past the experimental stage, and a reliable machine can be trusted to do its work with very little attention. With an incubator hatching can be started at any time, and I have



Fig. 14 —Incubator.

proved time and again that chickens so hatched and reared thrive better and grow faster than when hens are used. It is, besides, far cheaper to supply one 100 incubator with oil than to feed eight hens, and the work done is the same.

Testing Eggs in Hatching.

In connection with hatching I find the testing of the eggs is commonly neglected.



Fig. 15.—Testing an egg.

There is considerable loss from this neglect, as unfertile eggs removed on or before the seventh day can be used as food for the chickens, and a bad egg or two either below the hen or in a machine spoils the results. This testing process is most simple, and ought always to be done not later than the seventh day (fig. 15). All that is necessary is to darken the room and look through the

egg against a strong light.

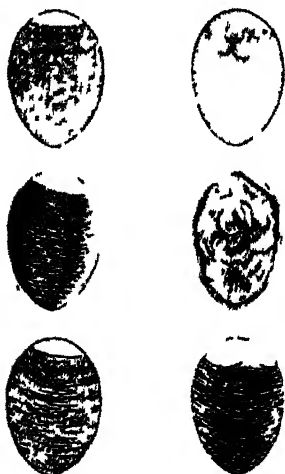


Fig. 16.—Fertile egg, 2nd to 19th day.
(Clear egg, left hand bottom corner)

A piece of cardboard with a hole cut in it about the size and shape of an egg will prevent the light coming to the eyes. There is also a lamp made specially for testing purposes. If the eggs are examined about the seventh day the embryo can be easily seen in a fertile egg. An unfertile egg is quite clear, and resembles an egg which has never been set. With a little practice the embryo can be easily seen as early as the fourth day (fig. 16). There is a saving of space by removing the unfertile eggs from an incubator; and when hens are used, it is better to set three at a time, as, after testing, two may be able to take all the fertile eggs, leaving the third one free for another sitting.

Feeding Chickens.

The best food to start young chickens with is a custard made with these unfertile eggs and milk. With this feeding water can be dispensed with for the first four or five weeks, thus avoiding a frequent cause of disease.

Before chickens are marketed there is rarely or never a proper process of fattening. The birds are just sent to the poulterer as they have grown. Now all chickens intended for killing should be separated in wooden houses holding from twelve to twenty each, and fed as liberally as possible. The best food for this purpose is whole ground oats with milk and a little fat, and it is wonderful how quickly birds will grow and fatten with this treatment. In England this fattening process is carried out on a very large scale. One establishment buys so many as 2000 birds weekly: a great number of these come from Ireland, and cost about 1s. 6d. each. The birds are confined in cages, three or four in each, and given as much food as they can eat, generally whole ground oats mixed with milk and fat. As soon as the birds lose their appetite they are crammed with a machine for about a week, then killed, trussed, and marketed—the whole fattening process only lasting three or four weeks. Birds fattened thus usually bring 8s. to 12s. a couple. Whilst not advocating such a complete system for farmers generally, a great deal more might be done by fattening the birds to be killed. No one thinks of selling cattle or sheep for killing unless they have been properly fattened.

Marketing Eggs.

In marketing eggs the usual plan is to sell them once a-week, all sizes and colours being mixed. Foreign eggs do not come this way, but are carefully sorted according to size, colour, and quality, and sold as firsts, seconds, thirds. To obtain a uniform size in packing a simple sorting-board is used with three holes of different sizes cut in it (fig. 17). The eggs are passed through these and graded accordingly.



Fig. 17.—Sorting board

Preserving Eggs.

For preserving eggs there are one or two reliable recipes which I may mention. One is 2 lb. lime, 1 lb. salt, 2 ounces

cream of tartar, and 6 quarts of water. Boil the water, and while hot pour over the lime in the jar; when perfectly cold stir in the salt and cream of tartar, and the mixture is ready for the eggs: store in a cold place. Another more recent and better method of preservation is with water-glass. This water-glass is a silicate of soda which renders the shell of the egg airtight, and so preserves its contents. It is now widely used, and is got in tins of various sizes, full directions being given on each tin. The glass is dissolved in boiling water, and then diluted with cold water to the proper strength. When perfectly cold the eggs can be put in. Wooden tubs or barrels, earthenware jars, iron or zinc buckets, may be used, and the eggs put in the liquid as they are gathered. When full the jars should be covered with a lid or strong paper and stored in a cold place. Eggs so preserved can be kept six to twelve months and come out in very good condition. The fresher the eggs are when put in the liquid the better.

Conclusion.

I have tried to point out in a general way how poultry-keeping may be made a help to the farmer, and I would like to see more encouragement given to this branch of agriculture by our local and national agricultural societies. It is necessary nowadays to take advantage of every item to make ends meet, and I know of no other department which will leave as large a percentage of profit as the poultry if proper attention is given them. The first outlay of capital is very small, and returns are quickly got. A little intelligent management must, however, be given, and old methods to some extent superseded. Ordinary farming has in the last quarter of a century passed through a revolution. Land once in cultivation is now lying waste, and a gradual thinning of the country population, with a corresponding increase of the town population, is the result. Surely every industry which encourages the growing and keeping of a healthy country population is worth very careful consideration.

ON ANTHRAX.

By Professor JOHN DUNSTAN, M.R.C.V.S., F.R.S.E., Royal (Dick)
Veterinary College, Edinburgh.

ANTHRAX is unfortunately a disease which is not only always with us in Great Britain, but which increases steadily and surely every year, as a reference to the published tables of the Board of Agriculture will show.

This is a somewhat disquieting announcement in face of the fact that it has been scheduled as a contagious disease since 1886, and that since that time the legislative machinery of the Board of Agriculture has been in action for the purpose, if not of actually stamping it out, at any rate of keeping it under control.

The accompanying table is compiled from the Annual Reports of the Board of Agriculture. There is reason to fear, however, that these returns are far from reliable, as it is well known that many outbreaks of anthrax are never reported by the owners, for various reasons; and not only are private individuals defaulters in this respect, but in some instances the local authorities do not set a good example.

OUTBREAKS OF ANTHRAX, 1887-1903.

Years.	Counties.	Outbreaks.	Cattle.	Sheep.	Swine.	Horses.	Deer.	Total.
1887	51	236	415	37	184	...	...	636
1888	49	180	280	45	76	...	...	401
1889	45	167	236	4	69	...	461	770
1890	48	152	253	72	210	...	...	535
1891	50	226	300	15	156	...	...	471
1892	60	289	445	11	190	...	...	646
1893	68	563	833	108	313	46	...	1300
1894	64	494	625	125	188	62	...	1000
1895	66	434	604	158	140	32	...	934
1896	64	488	632	34	200	38	...	904
1897	67	433	521	39	284	38	...	892
1898	73	556	634	22	161	39	...	856
1899	67	534	634	69	253	30	...	986
1900	74	571	668	40	204	44	...	956
1901	63	651	708	76	152	35	...	971
1902	71	678	746	50	192	44	...	1032
1903	...	761	...	...	...	...	...	1127

For the first five years for which statistics are available—viz., 1887-1892—the average number of outbreaks was 192. In 1893 there was an enormous increase, the number of outbreaks springing up to 563. For the five years following this the numbers are somewhat lower, averaging 481. In 1898 we find them again up to 556. In 1899 there is a slight drop to 534. Since this, every year has shown a marked increase, the actual figures being—for 1900, 571 outbreaks; 1901, 651 outbreaks; 1902, 678 outbreaks; 1903, 761 outbreaks. There have thus been during the past year four times as many outbreaks as the annual average of less than twenty years ago.

The returns for the first four weeks of the present year show that there were 81 outbreaks, with 100 animals attacked. The figures for the corresponding four weeks of the three preceding years were as follows:—

1903	61 outbreaks,	95 animals attacked.
1902	64 "	99 "
1901	44 "	64 "

These figures speak for themselves.

Various explanations have been offered to account for the very remarkable increase which took place in 1893, when more than twice as many outbreaks occurred as had ever been recorded in any single year previously; these explanations will be discussed later, as they are of great practical interest. We may notice in passing, however, that since that remarkable increase in 1893 the disease has continued to be far more prevalent in this country.

It is not on account of any great pecuniary loss to stock-owners that anthrax is of such importance, for as a matter of fact only one animal out of every 38,623 dies annually of anthrax in Great Britain, and the total annual loss is probably not much over £15,000. For the five years 1898 to 1902 only one ox died in every 11,218, one sheep in every 516,480, and one pig in every 12,325. These figures show, then, that the loss is not great; they also show that the disease is over forty times as prevalent in oxen and pigs as it is in sheep.

The chief interest of anthrax lies in the fact that it is an exceedingly dangerous and fatal disease both to the lower animals and man, and that it tends to spread with great rapidity if proper precautions be not taken to prevent it.

Perhaps the largest outbreak which ever occurred in this country was that which took place at Great Shelfin Farm, near Barnstaple, in Devonshire, in the spring of 1895, where on a single farm 59 cattle, 8 sheep, 5 horses, and 1 pig died in ten days. It is not necessary to search far for the cause of this extensive outbreak. The first stirk had its throat cut in the

shed with the other animals, the blood being allowed to run over the floor of the shed. The farmer had a practice of allowing the whole of his cattle—fat stock and all—to go out to water every day. In walking through the shed they probably carried some of the blood on their feet, and so contaminated the water and food of which they afterwards partook.

Another large outbreak occurred in Lincoln in 1877, in which 46 cattle died in three days. In this case the first animal attacked was skinned in the shed where the other animals were housed.

Yet another extensive outbreak occurred in Essex in 1887, where, after a post-mortem examination on the first animal which died, they bled the others as a preventive, but apparently with ill-effect, as 36 died in about three days.

In other cases in which numerous deaths have occurred during an outbreak, the cause has been traced to grain and other feeding material carried in carts which have been previously used for transporting carcasses of animals dead of anthrax.

In view, then, of this greater prevalence,—especially in some of the counties of Scotland,—and of the ever-increasing knowledge regarding the disease and the means by which it is spread, as well as of the great differences of opinion which exist as to the most satisfactory method of disposing of the carcasses of animals dead of anthrax, it may be advantageous to discuss afresh the nature of the malady, and to consider some of the most interesting and important problems connected with it in the light of recent research.

Anthrax is a rapidly fatal contagious disease, caused by the introduction into the system of a micro-organism known as the Anthrax bacillus. This is a definition which must be strictly adhered to, as it is an absolute impossibility for the disease to exist in the absence of this particular organism.

There is, unfortunately, at the present time a marked tendency to use the word anthrax loosely; the term “anthracoid” has even been coined and applied by veterinary writers to various diseases which were supposed to resemble anthrax. It is a word which is meaningless, from a scientific point of view, and which had better be allowed to fall into disuse. It is, I regret to say, not uncommon even in these enlightened days to hear the opinion expressed that there are two different kinds of anthrax—one due to the specific bacillus, the other not; one contagious, the other not. This is a distinct and glaring error which we feel it our duty to endeavour to correct.

At the outset, then, all these *other* diseases must be strictly excluded from any right whatever to the title of anthrax, and no disease whatsoever must be allowed any claim either to the word anthrax or to any modification of it, except that

which is caused by the Anthrax bacillus; and the sooner this is universally recognised the better for all concerned.

The bacillus was not discovered until the year 1849, just fifty-five years ago; but the disease caused by it was known and described long before this time. In fact, some people hold the opinion that the fifth plague of the Egyptians—viz., “murrain,” mentioned in the eighth chapter of Exodus—was none other than anthrax; believing too, in support of their opinion, that the ninth plague was also anthrax in the peculiar form in which it attacks human beings—viz., malignant pustule (a local sore). All this, of course, is and must remain mere theory. It is certain, however, that under the names of Siberian plague, Loodianah disease, Milzbrand, Ignassacer, Jaswa, and Gutterbea, it has existed throughout both Europe and Asia from the very earliest times; and that under the names of murrain, splenic fever, splenic apoplexy, and Cumberland disease, it has existed in this country for a great number of years.

The disease, as it affects the lower animals, is of the nature of an acute specific fever, to which all the common domestic animals are susceptible; but possibly not all equally so, as before-mentioned, it being about forty-six times more prevalent in oxen than in sheep—which is rather difficult of explanation, as sheep are just as susceptible to *artificial* infection as oxen, or even more so. It suggests either that oxen are more susceptible to *natural* infection than sheep, supposing the natural mode of infection to be by the alimentary canal, or that sheep are not so frequently exposed to the infection. There is, however, good reason to believe many cases of anthrax in the sheep are never recognised.

There can be but little doubt that most of the cases of anthrax occurring in this country in herbivorous animals are due to infection by ingestion, either the food or water containing the bacilli or spores. At pasture the animals may be infected by eating contaminated grass or drinking contaminated water. Indoors the dried fodder may be responsible—roots covered with soil, hay, corn, artificial feeding materials, cakes, &c.

In most cases it is probably the spores which cause the trouble, as it is found experimentally to be much easier to infect an animal by means of the spores than the bacilli—the latter being destroyed by the action of the gastric juice. It is uncertain whether there need be an abrasion of the mucous membrane of the alimentary tract in order that the micro-organism may gain entrance to the system: this is, however, of no practical importance to us just now.

The method of ingestion is probably responsible for all the cases of anthrax seen in the pig and dog in this country: in

both these animals, feeding on the uncooked flesh of an animal dead of anthrax is generally the cause.

Human beings are affected in three different ways—viz., ingestion, inhalation, and inoculation. The first of these methods is, however, not common in this country; because, although anthrax flesh is sometimes eaten, yet in the process of cooking the temperature is generally sufficiently high to destroy the bacilli. There is a greater danger to the cooks in handling the meat previous to cooking than there is in eating it, as inoculation may occur if there be even a slight scratch on the hand.

Anthrax caused by inhalation is well known here under the name of wool-sorter's disease, and in Germany under the name of rag-picker's disease. (Wool-sorter's disease was first discovered to be anthrax by Dr Bell of Bradford.) It is caused by the inhalation of spores from foreign wools—those from Russia, South America, India, Africa, Persia, Asiatic Turkey, countries where anthrax is prevalent, being chiefly responsible.

Perhaps malignant pustule is the most frequently seen of all the forms of anthrax in man in Great Britain. This is the result of infection by inoculation, and is caused by entrance into the system through an abrasion on the skin of the bacilli or spores of anthrax. It is chiefly seen in butchers, hide-porters, veterinary surgeons, and others who have the handling of carcasses. The seat of inoculation is generally on an exposed part, such as the hands, face, neck—particularly the latter in the case of the hide-porters at the London docks. It may be useful to describe the symptoms of the latter condition here, as this is the form in which it is most likely to be met with in the cases of persons attending cattle.

From one to three days after infection has taken place—generally, however, only a few hours—a red itching pimple rises up at the seat of inoculation, a swelling gradually develops round this and forms a little bladder at the top containing clear or blood-coloured fluid, inflammatory swelling proceeds, and within thirty-six hours there is a dark-brown scar, and around it a series of small blebs. The swelling is now great, extending along the arm to the lymphatic glands in the arm-pits, or if on the face to the glands of the neck. These local symptoms are accompanied by fever and a general feeling of illness, and death takes place in from three to five days unless prompt and vigorous treatment be adopted. When surgically treated recovery generally takes place.

The period of incubation—that is to say, the period which elapses between introduction of the infective material and the development of the first recognisable symptoms—varies within comparatively narrow limits. In the case of cattle and sheep it is from twenty-four hours to four or five days. The time

which elapses between infection and death is about the same, but rarely under thirty-six hours; it may be in some cases, however, delayed for eight or ten days, and in some cases in cattle recovery takes place. Anthrax is not invariably fatal in cattle, then. In fact, in any large outbreak the thermometer will pick out several animals which are affected but which eventually recover; even of those which show decided clinical symptoms—that is to say, of those which are visibly ill—20 or 30 per cent may recover. It is more fatal, though, in sheep. It is very doubtful whether medicinal treatment of any kind will influence the course of a case, although it is the custom to administer powerful antiseptics. The disease generally runs its course so rapidly that it is very rarely that an animal is seen ill, the first evidence of the outbreak being the finding of the animal dead either in the field or byre. Fortunately the greater number of outbreaks end here, and no further deaths occur, especially if proper attention be paid to the disposal of the carcass and to disinfection of the premises.

In the ox the first symptom can only be detected by means of a clinical thermometer: it is a rise of temperature, often to 107° F., gradually falling as the disease progresses. This is followed by a quivering of the muscles, especially of the hind-quarters and limbs. Sometimes, although not frequently, this shivering affects the whole body. The extremities—feet, horns, and ears—are cold and clammy; there is extreme depression, no disposition to move; sometimes the respirations are hurried, “blowing”; at other times the animal shows signs of abdominal pain; the action of the heart is rapid, the pulse is very weak; the fæces are generally soft, and frequently accompanied by blood-clots; the urine is also sometimes blood-stained; there is a mucous discharge from the nostrils and mouth, which is also frequently blood-stained; the mucous membranes are injected and dark. Death usually takes place quietly, but in some cases it is preceded by excitement and struggling.

The symptoms in the sheep are much the same as in the ox, with the addition of convulsions and champing of the jaws; the disease is, however, even more rapid, seldom lasting more than an hour or two, death usually taking place again without much struggling or excitement. In some instances the sheep is taken ill quite suddenly, appears, in fact, as if in a fit, falls down, and dies immediately.

The disease is not quite so rapidly fatal in the horse—in fact the animal is usually noticed to be ill for some hours before death takes place. There is again the marked rise of temperature to 103° F., 104° F., or even 105° F., the other symptoms varying according to whether the throat or the intestinal canal be the part primarily affected. If the former,

there is a tense and hot diffuse swelling of the throat, which shades gradually off into the healthy tissues, and probably before death takes place extends from the throat to the entrance to the chest; accompanying this swelling will be marked difficulty of breathing, the respirations being short, hurried, and sometimes noisy.

If the infection be intestinal there will be high temperature, a cold clammy feeling of the surface of the body and the extremities, dilatation of the pupils, mouth partially open, staggering gait, weak—almost imperceptible—pulse, semi-consciousness, head occasionally turned backward towards flank; in some instances symptoms of violent abdominal pain may be present, also shivering fits, quivering of the muscles, diarrhoea sometimes accompanied by blood-clots.

It is probable that many cases of anthrax in the horse affecting the intestinal canal are never diagnosed, as the symptoms so closely resemble those of so-called "colic" and its complications, in which it is quite a common occurrence for death to take place after only a few hours' illness. Even if a post-mortem examination be made, the appearances are not always sufficiently definite to enable one to give a decided opinion, so that unless a microscopical examination of the blood be made it is very possible that the true nature of the condition will not be recognised, and consequently efficient precautions to prevent its spread are not taken.

The symptoms in the pig, together with the history that the animal has recently fed on uncooked flesh, are sufficient to enable one to diagnose anthrax with almost unerring certainty without recourse to the microscope, and this cannot be too widely known. The usual history of a case of anthrax in the pig is that a carcass of an animal which died somewhat suddenly has been left lying unburied, and that the pig has had access to it, and of course had a meal off it. Soon after partaking of the feast the pig is seen to be acutely ill, the most prominent symptom being a large swelling in the region of the throat; indeed this symptom is so characteristic of anthrax in the pig that in nearly every instance one would be justified in giving one's opinion "anthrax." The other symptoms are rise of temperature, weakness of the pulse, rapid action of the heart, great prostration, and shivering. The animal seldom lives longer than twenty-four hours after exhibiting the first clinical symptoms, although occasionally two or three days.

In the dog, swelling of the throat is generally a prominent symptom; there is great depression, accompanied by loss of appetite and high temperature, weak pulse, &c.; but dogs more frequently recover from the disease than any of the other animals.

It is neither necessary nor advisable to make a post-mortem examination of a suspected carcass in order to determine whether it is dead of anthrax or not. The appearances, however, of an anthrax carcass are often very characteristic, especially in the ox, provided always that decomposition is not too far advanced. Putrefactive changes set in immediately after death, and proceed with remarkable rapidity. The abdomen becomes enormously distended owing to the formation of gases in the stomach and bowels. The anus is frequently everted and a blood-stained fluid slowly dribbles from it, also from the vulva in the case of a female. From the nostrils a bloody froth is constantly working, and from the mouth and eyes a clear or blood-stained fluid frequently drips. On cutting the skin preparatory to opening the abdominal cavity the blood is noticed to be very dark in colour, and to be very fluid.

In the case of the ox the spleen or melt is generally found to be enormously enlarged,—even to ten times its normal size,—and to have its structure broken down. To such an extent does this occur that if held up by one end the contents run to the bottom, so that it resembles a bag of pulp. If it be now incised the pulp will flow out, its appearance resembling tar. This enlargement of the spleen is not of such constant occurrence in animals other than the ox, in which it is comparatively rare to meet with a case without it; in fact one might almost go so far as to say that in the other animals a marked splenic enlargement is an exception rather than a rule—at any rate the excessive enlargement which is so characteristic of anthrax in the ox is generally absent in the other animals.

In most animals the intestines are found to be greatly inflamed, and frequently to contain blood; the lymphatic glands of the intestine also participate in this inflammation, and in many cases there is an accumulation of blood-stained fluid in the abdominal cavity external to the intestines; the bladder frequently contains a small amount of blood-stained urine. No other abnormality is to be detected, except that most of the other organs seem to contain a large quantity of dark-coloured blood.

If during life one of the prominent symptoms has been swelling of the throat, then after death the swollen tissues will be found to be filled with a clear straw-coloured fluid.

Fortunately, however, it is quite unnecessary to make such an extensive post-mortem as this, as not only would it endanger the life of the person making it, but it would in all probability, by shedding the blood, infect the ground on which the carcass was opened, and if the weather was sufficiently warm, allow sporulation to take place. All that is necessary, then, is to take a drop of blood from one of the superficial veins and examine it

under a microscope in order to detect the anthrax bacilli. The blood should preferably be taken from an ear or foot.

The bacilli are usually to be found readily enough in the blood from these sources, except in some rare cases of local infection and in the case of the pig, in which animal they are found in the swollen tissues of the throat. In order to facilitate matters, though, the blood should be as fresh as possible—in fact, the sooner after death the examination takes place the less risk is there of making an error in diagnosis. A drop of blood is taken from one of the extremities of an animal recently dead of anthrax, then, and examined under a magnification of about 500, or better still 1000, when floating about among the red and white corpuscles are noticed little rod-shaped bodies (generally very numerous), the length of which, roughly speaking, corresponds to the diameter of a red blood corpuscle, the breadth being only about from one-tenth to one-fifth the length. Perhaps the best way of describing them in familiar language is to say that they look like little pieces of chipped hair distributed profusely among the circular corpuscles.

(If the animal from which the blood has been taken has only been dead for a few hours, and bacilli be present in the blood in large numbers, it is generally sufficient evidence that anthrax was the cause of death; but after a time other bacilli swarm into the blood, and then it is necessary to resort to other more complicated methods in order to distinguish between anthrax bacilli and others which closely resemble them in appearance.)

When examined unprepared in this way they appear to be structureless, but by subjecting them to the action of certain dyes or stains we are able to demonstrate that they are in reality composed of more or less numerous segments held together by a sort of gelatinous envelope, which completely ensheathes them, and forms little biconvex buffers between adjacent segments. When grown artificially outside the animal body on suitable soils, the segments are united end to end in long threads instead of being broken across into short rods, as they appear when growing in the blood under natural conditions. The reason why the long threads form in artificial cultures is probably because they are at rest and undisturbed, whilst in the blood-stream they are being constantly buffeted about as they are whirled along in the current.

The bacilli increase with marvellous rapidity in the living animal by simply growing out to twice their normal length, and then dividing across into two. This is the *only* way by which it is possible for growth to take place in the living animal, and it is very important to remember this as a practical point to be taken advantage of in adopting means for the proper disposal of anthrax carcasses.

As previously mentioned, the appearance of the bacilli varies according to the method of staining adopted: these different appearances are very valuable, as they serve to distinguish anthrax bacilli from others which closely resemble them when unstained.

The organisms which are more particularly liable to be mistaken for anthrax are the putrefactive ones, which very soon after death begin to swarm into the blood in enormous numbers from the intestinal canal, which is their natural home during life. This explains why an examination made immediately after death is far more satisfactory than one made some days after; the blood then contains the anthrax bacilli in pure culture—there are no other bacilli of any sort present with which they can be confounded. It also explains why an ear or a foot should always be sent to an expert for examination in preference to any part of the internal organs. The putrefactive organisms make their way from the intestines into the large blood-vessels inside the abdomen, and gradually work their way along the vessels to the extremities; in fact, often it is possible to find a pure culture of the anthrax bacilli in the blood of an ear or foot three days after death, especially in cold weather, whereas in the more central parts of the body they will all have disappeared long ago, it being a notorious fact that as putrefaction proceeds so the anthrax bacilli are destroyed, disintegrated, and lost to sight, so that if the carcass be left unopened and no blood be spilt from it, putrefaction will proceed, the anthrax bacilli will all die, and the carcass will be no longer dangerous. If, however, any of the blood be shed, and the weather is sufficiently warm, a process called sporulation goes on, by which little bodies comparable to the seeds of plants are formed, which are *not* killed by the putrefactive organisms.

When the bacilli are stained with methylene blue and examined under a magnification of 300 or 400, the rods appear slender and their ends square cut; under a higher magnification the ends are found to be really concave. If stained with gentian violet the rods appear somewhat thicker than by the methylene-blue method, because the gelatinous envelope is in this case stained too, and by subjecting the preparation to the action of acetic acid the gelatine envelope is rendered still more distinct. The demonstration of this envelope is of the greatest importance, as it is one of the points by which it is possible to distinguish anthrax from the other bacilli which resemble it.

It is noticed, too, with the methylene-blue method of staining, that in blood which contains putrefactive as well as anthrax bacilli the former stain more deeply than the latter, and in fact that the anthrax bacilli gradually lose their affinity for the dye, and stain less and less deeply, until finally they will not take

the stain at all, whilst in the case of the putrefactive organisms no such diminution in the staining affinities occurs; in fact, in a specimen of partially putrid blood the putrefactive and anthrax bacilli may be seen lying side by side, the former very deeply stained a deep blue and the latter only faintly tinged pale blue.

Another useful method of staining is that known as Gram's method: it is rather a complicated proceeding, but as the anthrax bacilli stain readily with it, and another bacillus which closely resembles it, and which is in fact not infrequently mistaken for it—viz., the bacillus of malignant œdema—does not take the stain at all, it serves as a ready practical means of differentiating the two.

M'Fadyean has during the past year drawn attention to a new and valuable method of diagnosing anthrax which he has discovered. It consists in preparing a thick blood film on a microscopic slide, fixing at a temperature of 100° C., staining with Merck's pure medicinal methylene blue, and mounting in Canada balsam. By this method the red blood corpuscles are not fixed, they are as a matter of fact disintegrated and washed off during the manipulation of the slide, and only bacilli and an occasional white corpuscle are seen. The nuclei of the latter are of a greenish-blue tint; the anthrax bacilli are blue, the depth of which is variable, according to the length of time which has elapsed between the death of the animal and the taking of the blood. Around and between the bacilli, chiefly in close proximity to them, is noticed a violet or reddish-purple coloration of the amorphous material between the bacilli. This peculiar contrast of colours is only seen in the case of anthrax, and is frequently so distinct as to be seen readily with the naked eye without the necessity of resorting to the microscope.

The most reliable method of detecting anthrax with certainty, and the one which is used in all legal cases, is by inoculation. This, however, can only be done in places and by persons licensed by the Home Secretary. The method consists in injecting some of the blood, preferably that taken from an ear or foot, into a guinea-pig or rabbit. If it be a case of anthrax, the inoculated animal will quickly die, and the bacilli can be easily found in its blood.

In the process of sporulation little, bright, highly refractile oval bodies are formed inside the bacilli, which they frequently absorb and replace. It is a process necessary for the preservation of the species, the spores or seeds being far more resistant than the bacilli to destructive influences of all kinds—putrefaction, chemical agents, sunlight, high and low temperatures, even resisting boiling for five minutes (Koch), or a temperature of 70° above boiling-point dry heat for several hours. It goes without saying, then, that they are capable of standing all the

changes of our climate with impunity; they have, in fact, been known in a dry condition to retain their vitality for years, and it is possible that they may be able to retain it indefinitely.

Sporulation can take place only in the presence of air or oxygen. This is why we never find it occurring in the body during life, or even after death, as long as the carcass is left unopened, and why an animal dead of anthrax should be buried uncut. If the temperature is suitable, and the carcass of an anthrax animal be opened and the blood spilt, sporulation takes place, and a supply of material is soon available sufficient to kill all the animals on a farm. Fortunately, however, it is only during the height of summer that the temperature is ever high enough in this country for sporulation to take place. It is just possible for the process to take place as low as 70° F., but the growth is very slow and uncertain; it is only when the temperature reaches 99° F. that the growth becomes anything like prolific or active; it thrives best at the body temperature, and above 107° F. the process is again arrested.

It is possible for a spore to lie dormant in the soil for an indefinite period if kept dry and away from sunlight. M'Fadyean (the greatest authority on anthrax in this country) says he has reason to believe that a spore may, after lying dormant in the soil for a hundred years, be still capable of infecting an animal with anthrax if ingested with food or water; at any rate, as long as the conditions necessary for germination do not exist—viz., suitable temperature, moisture, and nutrition—the spore simply remains idle, waiting a favourable opportunity to develop into a bacillus.

Under favourable conditions germination of the spore takes place. Through a rupture in the envelope a little protoplasmic bud shoots out and develops into a bacillus.

It used to be considered impossible for the anthrax organism to propagate outside the animal body except in artificial cultures in the laboratory; this view has, however, been modified, and observers now generally believe that propagation does occasionally take place under favourable conditions on organic matter outside the animal body, but as the favourable conditions include a temperature of between 60° and 70° F., it is only rarely that it can happen in this country.

Various theories have from time to time been brought forward in order to explain how the bacilli cause death. What is probably the correct explanation is that, as a result of the life processes of the bacilli, certain substances are manufactured which act as virulent poisons to the cells of the body. To these substances the name *toxins* has been applied, and it is possible in many instances to separate these toxins from the organisms which give rise to them.

Experiments have been made by numerous observers with the object of testing the amount of resistance offered by the virus of anthrax to various germicidal agents. I give the following on the authority of M'Fadyean:—

(1) The mere fact of drying destroys anthrax bacilli in two months; it has no deleterious effect, however, on the spores—in fact, it is essential to their life.

(2) Sunlight is fatal to bacilli in blood in twenty-four hours, but spores resist it for a month.

(3) The bacilli are destroyed by a few minutes' exposure to a temperature of 140° F., but in order to instantly destroy the spores a temperature of 320° F. is required.

(4) A 2½ per cent solution of carbolic acid, creolin, or chloride of lime, or one-fifth per cent of corrosive sublimate, quickly destroys the bacilli; but in the case of spores even a week's exposure to a 5 per cent solution of carbolic acid is not certain to destroy them. But a half per cent solution of corrosive sublimate is fatal to them in a few minutes.

(5) Gastric juice is rapidly fatal to the bacilli but not to the spores, so that most cases of anthrax are probably due to infection by the spores. Putrefaction is also rapidly fatal to the bacilli.

In order to study the life-history and habits of the bacilli they are frequently grown in laboratories on artificial soils. Cultures or growths are obtained by various methods on artificial media. They are sown out on to various suitable soils (like so many seeds), on which they grow more or less luxuriantly according to the nature of the soil and the conditions of temperature, &c. Anthrax grows readily on nearly all the media generally used for cultures.

In broth, after incubation at body temperature, the bacilli increase to an almost incredible extent, forming a white flocculent mass which sinks to the bottom of the tube in which they are grown.

In gelatine stab cultures the appearance is very characteristic. In about forty-eight hours the needle-track is seen to present the appearance of a white line, from which radiate out in various directions little spikes, which again give off lateral spikelets; in fact, the whole growth presents a form which has been aptly described as feathery. After a time the whole of the gelatine becomes liquefied.

The appearance of a culture made on a gelatine or agar plate is absolutely characteristic. The micro-organisms grow out into wavy clusters of thin filaments, and have been likened in appearance to a very fine crop of human hair. Blood serum and potatoes also serve as suitable soils.

The practical importance of these laboratory methods of

growing various species of micro-organisms will be apparent when I say that each particular variety has its own particular method of growth, and that the appearances presented by these growths are just as varied in cases of varied organisms as are those of the various plants of our flower-gardens. We are enabled to say, then, from the appearance of these artificial growths, whether it is or is not anthrax with which we are dealing.

It may be interesting now to consider for a few moments what it is that gives rise to so many outbreaks of anthrax in this country. On reference to the table, the first thing which strikes one is the enormous increase in the number of outbreaks in 1893. This increase was very remarkable, and it is no less remarkable that since that year it has been far more prevalent than it was before: the numbers are still, as a matter of fact, creeping slowly, but none the less surely, upwards. This problem was discussed at a recent meeting of the National Veterinary Association, when two theories were put forward to account for it. Professor Axe, who read a paper on the subject, suggested that it was partly the result of "the repeated introduction of fresh virus from outside sources," and partly "to the extension of the old stock of contagion." He attaches greater importance, however, to the first of these, and suggests that we must look to our imports of such things as hides, skins, wool, hair, bones, much of which comes from countries where anthrax is far more prevalent than in this country, and where sanitary legislation is either in its infancy or non-existent. He quoted a great many figures from the official returns to prove the enormous increase in the amount of these materials imported between the years 1887 and 1902, and others, to prove the frequency of anthrax outbreaks on lands through which passed water and refuse from the factories where these materials were worked. There is not the slightest doubt, then, that these materials are responsible for the introduction of a certain amount of anthrax from foreign countries.

Professor McFadyean suggested that the increase of 1893 was due to the great heat which prevailed during that summer enabling the bacilli to sporulate freely, and so to contaminate the soil for several years: he considered that, apart from the introduction of fresh virus from abroad, this factor was sufficient to account for the increase.

The drought of 1893, with consequent shortness of fodder, was followed by the importation of large quantities of foreign hay and other feeding materials, and that these are occasionally the medium for the introduction of anthrax there can be no doubt whatever. The various kinds of feeding cakes are sometimes contaminated, the seeds from which they are manufactured

being infected with the spores, which the process of cake-manufacture does not destroy. Cotton seeds from the Southern States of America are particularly liable to contamination. Linseed-cake, too, is sometimes responsible, the celebrated case of *Lord Brougham v. Pattinsons & Winter* still being fresh in our memories. Imported grain, too, sometimes contains the spores. Chilian hay has been frequently found in Liverpool to be contaminated with anthrax. Bran, too, has been the medium for introducing the disease—a large outbreak in Louisiana, U.S.A., was traced to it.

Most of these imported food materials are no doubt infected before they are put on board ship, but in one notable case contamination probably occurred during the voyage, as inquiry revealed the fact that the fodder was stored in the bottom of the hold of the vessel, whilst above it was stored a lot of wet hides. Bone-meal and crushed bones are also capable of carrying the infection; dissolved or vitriolised bones are safe, however, as the process of manufacture destroys the germs.

The following cases in which feeding materials were proved to be contaminated may prove of some interest:—

Denny v. Covington. Tried before the Lord Chief-Justice of England and a special jury in July 1895. Messrs C. & J. Denny, corn-dealers and importers, brought an action to recover the balance of an account for oats supplied in November and December to Messrs Covington. The defendants admitted the purchase and delivery of the oats, but pleaded that they were at the time of delivery contaminated with the germs of anthrax, and were responsible for the death of fourteen of their horses. They therefore opposed the claim for the price of the oats, and made a counter-claim for £370 to cover the loss occasioned by their use. Verdict for the defendants with costs.

Lord Brougham v. Pattinsons & Winter. Tried in the High Court of Justice, London, before Mr Justice Matthew and a special jury. Plaintiff claimed damages for loss of six valuable shorthorn cattle which contracted anthrax from the linseed-cake purchased from the defendants. Verdict for the plaintiff.

Finally, let us consider what is the best thing to do in the event of an outbreak of anthrax. According to the law, the first thing to be done is to report to the local authority, who are then supposed to do everything necessary at their own expense.

It should be remembered that every animal whilst alive is a source of danger on account of soil contamination,—the urine, fæces, and discharges from the mouth and nostrils all contain the bacilli: it is therefore advisable to isolate it in a building which can be thoroughly disinfected afterwards. The animal should not be slaughtered unless it can be done without the effusion of blood. It generally happens, though, that the animal

is found dead, without having shown any signs of illness; and it must be remembered that the carcass is even more dangerous than the living animal, especially if it be hot summer weather, when sporulation can take place. All the natural orifices of the body—nostrils, mouth, anus, and vulva—should be immediately plugged with plugs of tow saturated with carbolic acid; and unless it is possible to bury or burn it on the spot where death took place, it is a good plan to wrap the whole head in some old sacks, which can be destroyed with it. The carcass must be destroyed as quickly as possible without shedding blood, in order to get rid of the infective material; and even if there be any uncertainty about the case being one of anthrax, the law provides for its destruction in the same way as if it were certainly anthrax.

The Board of Agriculture regulation says that the carcass must be buried in its skin in some convenient or suitable place removed from any dwelling-house, and at such a distance from any well or watercourse as will preclude any contamination of the water therein, and at a depth of not less than 6 feet below the surface of the earth, having a layer of lime not less than 1 foot beneath, and a similar layer of lime above the carcass.

This means that in the case of an ox the pit must be about 9 feet deep, in order that by the time there is 1 foot of lime in the bottom, the upper parts of the carcass may be still 6 feet under. Practice and experiments on a large scale have definitely proved that there can be no possible danger of infection from a carcass treated thus. The bacilli will all be dead in three or four days, overcome by the putrefactive bacteria; sporulation cannot have taken place in the absence of oxygen and a sufficiently high temperature. The hot lime will finish the work of destruction.

The Board of Agriculture has recently advised local authorities that they should make provision for the destruction of anthrax carcasses by the process of burning or by exposure to a high temperature, provided this can be done without cutting the carcass. The reason for this advice is that "in the past the process of burial has in many instances been carried out in a very perfunctory manner," owing to difficulties met with—rocky ground, where considerable difficulty and expense are entailed in excavating to the required depth; marshy ground, where it is impossible to get to the required depth owing to flooding with water; long distance from lime-kilns, and consequent delay and expense in procuring lime.

The cremation method, if carried out thoroughly, will certainly be efficacious in destroying the carcass, but it is beset with many difficulties. In the first place, it is expensive; it is certainly not easy; it necessitates building some sort of a fire-place and the hoisting of the carcass on to it. This and the getting of the necessary materials together will mean some

considerable time; and, finally, it is not a more effectual method of getting rid of the carcass. It is unnecessary and impracticable.

The process, which the Board acknowledges is not "so economical as burial, and somewhat difficult to carry out," is as follows:—

Alongside the carcass cross trenches 9 inches wide and 12 inches deep are dug, the trench parallel with the carcass being 7 feet long, the other being 5 feet long, and at right angles and bisecting the former.

Four stones about 6 inches thick and about 12 inches square on the surface (a sufficient number of bricks will answer the purpose) are then placed in such a position that the carcass when it has been rolled over and placed on the stones will be about 6 inches clear of the ground, the centre of the trenches being underneath the centre of the carcass. The object of this arrangement is to ensure a sufficient draught for keeping up a fierce combustion of fuel during the process of cremation.

One ton of wood and 15 cwt. of coal, or of coal and coke, and two trusses of straw, should be provided. The straw is used for ignition, and the wood and coal are carefully built up round the carcass and should be well intermixed. The straw should then be lighted, and in from four to six hours the carcass will have been completely consumed. The addition of paraffin to the materials assists combustion.

A long pole should be used to clear away the ashes from the trenches and from underneath the carcass.

After the disposal of the carcass attention must be paid to the place occupied by the animal prior to death. If a house, all litter must be burnt and the walls and floors disinfected with a 2 or 3 per cent solution of creolin or carbolic acid or chloride of lime. If it is summer-time, however, these will not be strong enough to destroy any spores which may have formed, so it will be safer to use a one-half per cent solution of corrosive sublimate. If the death took place in a field, either a fire should be kindled over the spot on which the carcass lay, or it should be covered with a thick layer of hot lime; and as a further preventive measure all animals should be kept away from the field in order that any bacilli voided may be destroyed or washed away by the rain.

Various methods of preventive inoculation have been tried, but in all cases the results have been unsatisfactory in this country. They are not to be recommended.

In conclusion, we would say that in the event of a sudden death occurring among any of the animals on a farm, until the contrary has been proved the carcass should be treated as if it were anthrax, as careless handling may result in serious consequences similar to those described in Barnstaple, Lincoln, and Essex, in addition to the loss of human life. Further, all the other stock should be carefully kept under observation, and any animal which shows a rise of temperature immediately isolated as suspicious.

METHODS OF FARMING IN PERTH SHOW DISTRICT.

By A. S. GRANT, 'North British Agriculturist,' Edinburgh.

WITHOUT much doubt a weak point in our system of agricultural instruction so far has been a rather marked absence of detail in regard to different methods of farming pursued in different districts of the country. The agricultural student or farmer who has not travelled on his own account or studied systems for himself has little chance, as a rule, of learning what changes in cropping or in systems of management may be going on, it may be, within a few miles of his own door. And yet in these days of diminished returns and small profits—if profits there be at all—this is a matter of very great importance. Undoubtedly the man who is best facing, and will continue best to face, the altered circumstances of present-day conditions, is not the man who is content to follow unquestioningly in the footsteps of his father or grandfather, but the man who has been quick to adopt new methods or modifications of new methods as they have arisen or been found advantageous by others. A few years ago, for example, the rearing of fat lambs for the early summer markets was, as an industry, little known to the rank and file of farmers. Now many farms favourably situated for markets derive a not inconsiderable part of their revenue from this source. In the same way within recent years changes in cropping, as well as in the rearing and feeding of stock, have been introduced into different districts of the country with the very best results.

In the present article it is not proposed so much to give a description of the general methods of farming which prevail over the three counties, or parts of three counties, which constitute the Perth show district, as to give an account, in as great detail as space will permit, of the successful practice of three or four representative farmers in these counties. This, it is hoped, may prove of interest and be of value to farmers in other parts of the country.

PICTSTONHILL.

No apology is needed for beginning with the widely-known, and as generally esteemed, tenant of Pictstonhill—Mr W. S. Ferguson. Mr Ferguson has claims to recognition over and above his eminence as a tenant farmer; he is a public-spirited man, whose time and talents have for many years been un-

grudgingly devoted to the public interest, not only as a director of the Highland and Agricultural Society itself, but in numerous other capacities besides.

At the present time Mr Ferguson holds three farms—Pictstonhill, just outside of Perth, where he resides, and which has been rented for over twenty years from the Earls of Mansfield; Kinochtry, in the Coupar-Angus district, which was occupied for so many years by his father before him, and which is still one of the great centres of the Aberdeen-Angus breed; and Balgersho, in the same neighbourhood, which he has also occupied for a considerable number of years—practically, in fact, since he was a lad in his teens. Up to a year or two ago he also held the large farm of Balgarvie, which lies quite close to Pictstonhill, his total holding at that time extending to about 1000 acres of arable land.

Rotations.

The farm of Pictstonhill, with which we shall mainly deal on the present occasion, consists for the most part of black loam on a sandy subsoil. It is capital land, as a rule, for green-crop growing, but much of it is too soft for excessive yield of white crop per acre. Still, what is grown of these crops is usually of excellent quality and weight.

Being to a large extent a suburban farm—it is only a mile or little more out of Perth—Pictstonhill is largely devoted to the production of crops for selling off to dairymen. This is a class of farming which has been enormously developed of late years in different parts of the country, and we shall have occasion to refer to it again when we come to speak of Mr W. F. Bell's farming at Barns of Claverhouse, Dundee. As a rule this system has advantages, in the way of prices and otherwise, that are not possessed by the ordinary kinds of farming; but unquestionably it is very expensive to maintain, and does not lend itself to fixed rotations. At Pictstonhill, as a matter of fact, there cannot be said to be any fixed rotation, for although the land is, generally speaking, worked on a six and a seven course of cropping, it may even go into an eight. This, however, is resorted to only to meet special circumstances, such as a tendency to finger-and-toe in the turnip break, a feature of the eight-shift rotation, of course, being that the land lies three years in grass.

The usual six course followed by Mr Ferguson is—1st grass, 2nd oats, 3rd turnips, 4th barley, 5th potatoes, and 6th wheat, the wheat having grass-seeds sown with it. The seven course followed is practically the same as the six, with the exception that there are two years grass instead of one. An alternative,

seven course sometimes adopted is—1st grass, 2nd oats, 3rd turnips, 4th barley, 5th oats, 6th potatoes, and 7th wheat.

Both at Pictstonhill and Kinochtry, for the last ten years or so, the system has been more or less adopted of taking two white crops in succession for the purpose of reducing the potato break. Mr Ferguson considers that too large a potato break, although sometimes profitable, is too speculative a crop for ordinary farming in this part of the country.

Tillage, Manuring, and Seeding.

It is hardly necessary to say that in carrying out successfully such a system of farming as that followed at Pictstonhill, not only the tillage of the land but the seeding and manuring are matters of the first importance. In manuring his land Mr Ferguson adheres closely to the old-established plan of applying practically all the manure given in the rotation to the two green crops. The only exception to this rule is in the case of the second white crop, which usually gets a little top-dressing of artificial manures.

Another custom which he follows almost invariably, and with considerable success, is dunging his green-crop land on the stubble in the autumn. About three-fourths of the green-crop break on all the farms is treated in this way every year, and not only is it found to do quite as well as drill-dunging from a fertility point of view, but stubble-dunging greatly relieves the pressure of work in the spring. Indeed the crop in this way can usually be put in several days earlier than it could be were the whole break dunged in the drill. It is notable that this question of stubble manuring in the autumn has lately formed the subject of exhaustive experiment at the Government experimental stations in Canada, and not only were the results arrived at substantially in line with Mr Ferguson's experiences in Perthshire, but, contrary to what has generally been believed, freshly made manure was found to be as good for the purpose as rotted manure. Indeed there was found to be a substantial saving in using fresh as compared with rotted dung, for the latter was discovered to have shrunk almost 50 per cent during the time it was undergoing the change.

At Pictstonhill the quantity of dung per acre put on in the back end is generally from 25 to 30 tons of good farmyard manure made on the farm or cow and horse manure brought from Perth. About 1000 tons of the latter are driven every year, and this manure plays no unimportant part in keeping up the fertility of the farm.

. The dung, after being carefully spread, is allowed to lie for

several weeks if the weather be open, and is then ploughed down either with a high-cutting plough of the ordinary Scottish type or a chilled plough of American pattern. The latter ploughs do perfect work on the softer portions of the farm, and are largely used; but where there is any clay or tendency to stiffness in the land the high-cutting plough is preferred. With either plough, however, care is taken that the land is never ploughed wet. This is a point on which Mr Ferguson is very particular and cannot be argued out of. The land, after being turned over in this way, lies exposed to the atmosphere all through the winter, and is not again touched until the grubber or cultivator is put through it in spring to prepare it for the crop.

The Potato Crop.

When potatoes are the crop to be grown, the land in spring is first grubbed with a heavy cultivator and then rolled if it be very rough; but if it be not very rough rolling is dispensed with, potatoes of course not requiring such a fine tilth as either turnips or grain. When the grubbing and rolling (if required) have been accomplished, the drills are opened up in the usual way with a double-furrow plough, the depth being usually 4 to 5 inches and the width 27 to 30 inches. The width of the drill depends of course to a considerable extent on the variety of potatoes proposed to be planted. Up-to-Dates, for example, require more room than either British Queens or Beauty of Bute; while such a variety as Sutton's Abundance takes an intermediate place between them, requiring more space than the last- and not so much as the first-mentioned variety. Mr Ferguson's experience is that while a drill of 27 inches is ample for such a variety as British Queens, 28 inches is required for Sutton's Abundance and 29 to 30 inches for Up-to-Date. He considers it a mistake to crowd unduly the closer-growing varieties to save an inch of space.

The sets at Pictstonhill are planted from a foot to 15 inches apart. Mostly nowadays they are planted whole, although a few varieties may be cut safely enough.

When the potatoes have been planted they are usually top-dressed with a mixture showing the following analysis—viz., phosphate (mostly soluble), 28 per cent; sulphate of potash, 5 per cent; and ammonia, 5 per cent. From 5 to 6 cwt. of the mixture is allowed per acre, while not infrequently the crop also gets a little nitrate of soda at the time of earthing up. The quantity of the latter depends on the condition of the soil, but as a rule never exceeds 1 cwt. per acre. Under this treatment large crops of tubers are usually grown.

The potatoes are covered with an ordinary double-furrow plough, and before they have time to be near the surface they are again harrowed down with a heavy iron harrow until the ground is nearly level. In a few days the drills are set up again with a drill-plough—generally a three-furrow American plough, of which there are two on the farm. Shortly after this they are again harrowed down with a circular harrow. After the plants come well through the ground the drills are stirred with the three-furrow American plough, which this time has the grub teeth on instead of the mould-boards. If any weeds should come up after this, the farm-workers are put through the crop with hoes to cut them down; but very seldom after this treatment on land of this class is it necessary to give much hand-labour. After the shaws of the growing plants have half spread over the drills the grubber is again put through them, and shortly thereafter they are earthed up for the first and last time. Mr Ferguson does not believe in earthing up potatoes twice.

The Turnip Crop.

The turnip-land in its early stages is treated pretty much in the same way as the potato-land, as much of it being dunged in autumn as possible. But on this class of land it is found that the best crops of turnips are grown where the land has been least worked; consequently, should the weather be at all suitable and the land clean enough, the artificial manures, which usually consist of about the same ingredients as in the case of potatoes, but with 2 per cent less of potash, are sown on the stubble furrow, which is then stirred up with the cultivator, rolled, and drilled, and the turnips sown. But in some seasons it is necessary to clean the land before putting in the crop, and when this is necessary the cleaning is done by cross-ploughing a second time and grubbing in the usual way. The best crops, however, have been grown with no working at all except harrowing and rolling on the stubble furrow and drilling up once.

The quantity of turnip seed sown per acre varies a good deal. In the early part of the season, to meet the ravages of fly, as much as 6 lb. of swede seed is allowed. This, however, is gradually reduced to 4 lb. as the seeding season advances. By the time sowing of yellows begin 2 to 3 lb. of seed is usually found quite sufficient.

The first week of May is the usual time for beginning the sowing of swedes, and the work goes right on until the whole crop is finished. Thinning is done wholly by hand-hoe, the cost in an ordinary way being 1½d. per 100 yards, although it goes up to 2d. in an emergency. As a rule about three plants are left

to the yard on a 26-inch drill. After the turnips have got well over the singling stage the three-drill American grubber is put through the drills. Then the hand-hoers go through them a second time, cutting down any weeds that the small grubber may have left. The drills are then finished off with a water-mark, which is done by putting the webb on the three-furrow grubber and running it down the drills without either earthing up the turnips or touching their roots. Mr Ferguson considers it a great mistake to earth up turnips, and never does it.

Preparation for Grain Crops.

The white-crop land is prepared in the usual way—that is, it is ploughed in the autumn or winter, either with a high-cutting or a chilled plough. For stiff land, as in the case of the green crop, the high-cutting plough is generally preferred but on the softer land ploughs of the Oliver or Dux type answer quite well, for, although the soil may not be set up so neatly, it is generally better cultivated, and the drill gets a better hold of it when sowing.

Most of the white crops are drilled in. The quantity of seed sown depends on the varieties grown. With the old varieties of oats 3 to 4 bushels per acre were considered enough, but with the new varieties 6 to 8 bushels are required. The latter apparently excessive seeding is by no means too much for some of the new varieties. A method adopted last year for sowing the new varieties, which was quite successful, was to sow 4 bushels with the hand on the furrow and then drill in the other 4 bushels crosswise. This, it was thought, gave a more regular crop than sowing it one way only and at one time.

Another system of Mr Ferguson's which is worth mentioning is to mix two or three varieties of oats or wheat together when sowing them so as to bring about a sort of natural cross-fertilisation between the varieties. This is an expedient which has also within the past year or two been advocated by Mr Jamieson of the Aberdeen Agricultural Research Association. The resulting grain is of course of no use for selling for seed purposes, but it is claimed that it is much superior to a single grain sample for milling, while the yield is decidedly higher. Mr Ferguson believes, however, that the mixed varieties become unsuccessful if grown more than two years, and that then fresh mixing becomes necessary.

Grass Seeds.

On all Mr Ferguson's farms the grass seeds are sown out with autumn wheat, being harrowed in somewhere about May.

This keeps the seeds from getting too far up and becoming troublesome in harvest. The mixture of seeds used depends on how long the land is to lie. If the land is to be early ploughed, up to 10 lb. of red clover, $\frac{1}{2}$ bushel perennial ryegrass, and $\frac{1}{2}$ bushel Italian ryegrass are generally used. For three years' grass, on the other hand, the mixture favoured is usually 5 lb. red clover, 3 lb. white clover, 1 lb. alsike, 1 bushel perennial ryegrass, $\frac{1}{2}$ bushel Italian ryegrass, and 3 lb. each timothy and cocksfoot.

Hay-Making.

Harvesting of crops at Pietstonhill begins about the end of June with the cutting of the hay crop. This is done by means of mowing-machines. Should the weather be at all suitable for hay-making, the hay is put up in bossed ricks of about a ton each, without any other interference after the cutting. Should rain fall in the interval between cutting and gathering, the swaith has frequently to be turned up; but the hay is never put into small ricks, as after it is put into the tramp rick it is usually considered safe. All the hay in this part of the country is put into the tramp rick, and from that taken to the stack. Sometimes the aftermath is sold to cowfeeders, but more frequently it is cut and fed to cattle in the courts. Generally, also, the farm horses are kept on it up to the middle of October.

Grain-Harvest.

Grain harvest follows any time after the first of August, according to the season. Frequently Mr Ferguson has come home from the Highland Show in the last week of July to start harvest, but last year he had three-fourths of his crop in the stook on the day of his annual sale, on the 7th of September. What was worse, he was not able to get a cart into the fields again for other three weeks. The grain crops are cut by sheaf-binders or reapers, according as it is standing well or twisted.

The sheaf-binder has enormously lightened harvest work on large farms. By its aid Mr Ferguson is enabled practically to overtake the whole of his harvest work with his regular workers, the only extra expense involved being some additional wages to women lifters.

Potato-Lifting.

Potatoes are partly raised by fork for the early market, but mostly by the digger in the usual way, the cost of the latter being about 15s. per acre. When stored the potatoes are put into pits not too deep and not too wide, and care is taken to

keep them as steep as possible. Potatoes, in Mr Ferguson's opinion, are often destroyed through being pitted too flatly. His own pits are usually not made wider than 4 feet at the base, the potatoes being built up as high as they will lie.

Storing Turnips.

The root crops, or such of them as are not sold, are stored as soon as possible after the potato crop has been secured. Storing turnips is done either by pitting in the ordinary way or by "sheuighing." The latter is unexcelled on dry land for keeping turnips sound till spring. "Sheuighing" can be done in two ways. The first way is to open a medium furrow from the back with a single plough, and cover in from the front when the turnips have been set in the trench. Under this method the turnips are usually quite well covered, but they are apt to be put too deep, so that snow and wet sometimes get to the roots and rot them. Without much doubt the better way of the two is to run a double-moulded plough lightly down between each pair of drills. After the turnips have been pulled and set into the furrow, the whole is covered over from the two sides with a plough of the description of the Oliver. The furrow on each side of the "sheugh" is thus considerably deeper than the roots and, as it were, drains the land, thereby preventing the roots from rotting through excessive falls of rain or snow during the winter. No better or safer method than this of storing turnips for spring use can be adopted on open land.

When turnips are to be stored in pits they are topped and tailed in the usual way. Formerly this was a work of great difficulty; workers could not be got to overtake the topping and tailing quickly enough when the weather became threatening. But now that there are topping-and-tailing machines—however imperfect they still may be—the work can be done in a fairly satisfactory manner in much less time and at less expense. In Mr Ferguson's experience it costs 7s. 6d. per acre to top and tail turnips by hand, whereas it can be done for 2s. 6d. per acre by machine. Certainly machine-dressed roots, when put into the pits, do not look so well as hand-dressed ones, but for all practical purposes there is little difference between them when they come out in the spring. It may, however, be noted that no machine has yet come out fit to deal successfully with the tankard varieties of turnips.

On none of Mr Ferguson's farms are turnips ever pitted when there is the slightest frost or "rime" on them. Nothing, in his opinion, is more prejudicial to turnips keeping than pitting them in that condition. Some people pit their turnips in large pits on the same principle as they pit their potatoes, but Mr Fer-

guson's experience is that they keep better in shallow square heaps about 3 feet deep, earthed up on the sides and well covered over with straw or other light material.

Prices and Yields.

Heavy crops are grown at Pictstonhill and big prices realised for turnips and grass sold off. Last year turnips made from £16 to £24 per acre, while the grass sold averaged £22 per acre. The yield of the former crop would be nearly 30 tons per acre, and of the latter nearly 3 tons per acre for the first cut. But it is not all profit; the manurial bill is a heavy one, while the cost of labour also runs high. It is Mr Ferguson's intention to practically give up selling grass, as he finds it on the whole to be quite as good, and far less expensive in cutting and carting, to make hay and either use or sell the aftermath.

Fairly good prices are also received for the straw sold off the farm, but prices for the other classes of produce—potatoes, grain, &c.—are ruled by the ordinary market quotations.

The usual plan of disposing of potatoes is to begin selling as soon after lifting as possible, and sell from week to week at market prices up to the following May or June. In this way it is calculated the grower gets all the good and all the bad that is going, and so avoids the speculative element.

Labour and Wages.

At Pictstonhill Mr Ferguson employs, all the year round, six men and some boys, besides a number of women. The men get with perquisites equal to about 20s. each a-week in addition to free house and garden, or bothy, fire and light. This is nearly double the rates that prevailed when he started farming, and men nowadays are not expected to do so much work as they did then. Women get 1s. 6d. and 2s. a-day for extra work—potato-lifting and the like—and 5s. a-day *dry time* in harvest. Boys are paid according to ability, but their wages also amounts to a considerable sum in the course of the year.

Live Stock.

Mr Ferguson has always made a strong feature of live stock—not so much, perhaps, at Pictstonhill as on his other farms. At the same time he had on Pictstonhill, at the time of our visit towards the end of November (1903), about a dozen Aberdeen-Angus pedigree cows, a number of young stock of the same description, several young bulls, and some cross feeding cattle. There were also a few special animals preparing for the

local Christmas markets, and in the courts about thirty cross calves going on for this year. A number of the latter will be sold at his annual sale in September next as eighteen-months-old cattle, and, judging from precedent, should realise anything from £15 to £18 apiece.

Home-Breeding.

These cattle are produced on a plan which has been found very profitable for a number of years back, and which should also be well within the reach of many of those who have difficulty in rearing calves by hand. Lean but well-bred Irish heifers—home-bred heifers would do if they could be got cheap enough—are bought in the month of May at from £7 to £9 and turned out with an Aberdeen-Angus bull—generally one bull to twenty or more heifers. The heifers are usually small and diminutive-like to look at when bought, but they quickly pick up on the grass, and by the end of the season have grown a good deal and put on not a little flesh. They are then comfortably housed in courts like store cattle until calving-time in the spring, being fed entirely on turnips and straw. About February, when the heifers begin to get near to calving, they are tied up in a byre and accustomed to be handled.

After the calf arrives and is able to take the whole of its mother's milk—it is sometimes necessary to hand-milk an extra milking heifer for a week or two after calving—the pair are turned loose in another court with other heifers and calves, and are again put on to the economical fare which the heifers had before calving, it being rarely necessary to give more than turnips and straw to a single-calf heifer. When grass-time comes the cows and calves are again turned out with the bull and remain in the fields until weaning-time in October. By that time the cows have grown into fair-sized good-looking animals.

After the calves are weaned the cows are allowed to go out and in according to the weather until the new year, when they are tied up, handled, and well-cared for until they are again at the calving. As soon as they produce their second calf the best of them are sold as newly-calved dairy cows. The previous handling which they receive usually makes them quite quiet for this purpose, and they realise easily, at public sale, from £14 to £18.

In the meantime the calves have been retained and are put on (two apiece) to the least valuable and smaller of the cows, which are specially kept for another season for the purpose.

Many excellent animals have been bred in this way. The fourth best animal Mr Ferguson had two years ago out of an

Irish £8 heifer was at the date of our visit a fine big 17 cwt. black polled bullock. A few years ago another of the same class was sold to Mr Peter Dunn, of Yorkshire, for £40, and afterwards became champion of the York and other fat-stock shows. Mr Ferguson has also won leading prizes at Smithfield (small cattle section) and at the local Perth sales with crosses of the same description—all bred by himself. These were no doubt picked animals, but the rank and file can easily be brought to 10 and 11 cwt., and sometimes over, at under two years old.

Advantages of the System.

Mr Ferguson claims for the system that it has several advantages over the main one—viz., that it is profitable. In the first place, it saves the farmer trouble with the milking of cows and the hand-feeding of calves. It also puts him beyond the necessity of depending on dairies or calf-dealers for his supplies of calves. In this way risks are avoided which otherwise would have to be faced, amongst them the danger of introducing calf troubles such as scour. In a fifteen years' experience of breeding calves in this way Mr Ferguson has never once lost a calf from what might be called the common calf troubles of the country. It also ensures a better coloured and more uniform lot of calves than would probably be got in any other way. Moreover, the risk of getting badly bred calves which turn out disappointingly is avoided. But to be thoroughly successful it is essential that the heifer should not be too dear to begin with.

Some people who have tried this way of rearing calves fatten off the heifers after getting only one calf from them; but Mr Ferguson does not think this a profitable system, because it takes far more to make a cow fat than it does to bring an in-calf cow to the calving, and the fat cow does not come to the same value as a newly calved one. Moreover, there is an important "extra" in the newly-dropped calf, which is worth from 40s. to 50s.

Method of Feeding Cattle.

It would take too much space to go fully into Mr Ferguson's general method of feeding cattle. The foods used are usually what are cheapest and best at the time. In the winter of 1903-4 a large quantity of damaged light-weight grain was used up. The grain is generally crushed and sweetened with treacle. In an average year, when potatoes are cheap, a good deal of this food is also given to the stock. The potatoes are fed whole, but due care is taken that the animals receive plenty of water and bulky feeding at the same time. There used to be a prejudice against

giving potatoes to stock, but Mr Ferguson feeds them not only to fattening bullocks but also to his yearlings. Taking one thing with another, however, the basis of his feeding is linseed cake (95 per cent purity). This always forms a proportion of the feeding given to all classes of cattle, and in his experience nothing is safer as a good and profitable mixer.

Other Farms.

There are several other points in Mr Ferguson's management at Pictstonhill which might usefully have been referred to had space permitted. On his other farms—Kinochtry and Balgersho—the stock kept are entirely pure-breds—Aberdeen-Angus cattle and Border Leicester sheep. The quality of both classes of stock and the excellent way in which they are handled are too well known to require mention here. Largely with the view of providing an ample supply of good grass Balgersho is kept in a steady eight course—three years grass, three white crops, and two green crops forming the rotation. The green crops are usually half turnips and half potatoes. Kinochtry, on the other hand, is worked mainly as Pictstonhill is, on a six- and seven-course cropping, although here, too, it is not unusual to have occasionally three years grass.

Mr Ferguson is fortunate in having good proprietors on all three farms. Kinochtry belongs to Miss Murray of Lintrose and Balgersho to Mr Walker, Dundee—and on each he has capital steadings, that at Kinochtry being practically new and constructed on the most approved labour-saving lines.

SOUTH INCHMICHAEL, ERROL.

A somewhat different but none the less representative style of farming is pursued by Mr George Bell, at South Inchmichael, Errol. Mr Bell's farm is on Lord Kinnaird's Rossie Priory estate, and has been in the hands of the present holder and his father since 1835. The farm is not a large one as farms in this neighbourhood go—it extends to only 156 acres—but it is managed with an exactitude and attention to detail that are quite exceptional. Mr Bell, indeed, is one of Perthshire's model farmers. Everything that he does is done well, nothing being left to chance.

Although South Inchmichael is to all intents and purposes a Carse farm—it is situated right in the centre of the famed Carse of Gowrie—it is not entirely clay. One portion of the farm is as nearly as possible strong black loam, partly on gravel, partly on till, and partly on green sand.

Drainage.

A very important matter on all Carse farms is the drainage. On South Inchmichael there have been four distinct systems of drainage. The first system consisted of a slit made by a spade formed for the purpose. Slabs, and later on bricks, were put on the top of the slits, but drains of this kind never wrought well. The next system was to cut a wider track about two feet deep and fill it in with stones, the leaders being formed of two stones coupled at the top. These drains did much better; many of them on the farm are still in excellent working order. Then followed pipes $1\frac{1}{2}$ inch in diameter, put in at a depth of about 16 inches; but these were found to be too small, and they were succeeded by horse-shoe tiles specially made with flanges at the bottom. These latter were put into what was called five-penny drains, from the fact that the tiles could be put in for 5d. per 22 yards. The mode of laying them was to open up the furrow of each ridge with a plough, lay the tiles in position, and cover them over again with a plough. This was the system in operation when Mr Bell's father entered the farm, and for ten or fifteen years after. The old Carse ridges, it should be mentioned, were originally formed so as to run the water into the lowest places. Long before there were drains at all, "gaws" were cut across at the lowest points to carry away the water.

About the years 1855 to 1875 the Government offered money for drainage at a percentage, but stipulated that the furrow drains should not be less than 3 feet 6 inches in depth. Many proprietors took advantage of this offer, and much land in the Carse of Gowrie was drained at that time with very bad results, because it was found that in many cases the drains were put in deeper than the outflow warranted. The next method of draining tried was 2-inch pipes with collars. These, however, were again found to be too small.

The succeeding system, and the system still followed, is one of $2\frac{1}{2}$ - to 3-inch pipes. South Inchmichael was entirely drained under this system in 1884, the tiles being put in the furrows of the original ridges at a uniform depth, where the outflow warranted it, of 2 feet 9 inches. In order to provide a suitable outflow and to drain the lower half of the adjoining farm of East Inchmichael as well, the proprietor brought up a main from near the farm of Newbigging, a distance of about $1\frac{1}{2}$ mile away. This main was composed of 15-inch spigot-faucet pipes for about 400 yards of its length, common 12-inch pipes and 10- and 8-inch pipes being used for the remainder of the distance. Manholes were constructed at regular intervals in the main drain for the purpose of relieving the pressure and for ventilation.

The system has worked admirably and given much satisfac-

tion. Outside the main drain the cost would be about £5 per acre. Although the farm is thus well drained it is still necessary on the clay division to form the old ridges, because if they are allowed to get level the centre of the ridge is apt to become bare or denuded of soil while the furrows get too rich.

Water-Supply.

Hardly less important than drainage is the question of a good and satisfactory supply of water. Mr Bell is very fortunate in this respect also. Wells were sunk a number of years ago on the farm at considerable expense by the then proprietor, Lord Arthur Kinnaird, and these, although they were frequently very difficult to construct, owing to the variety of strata encountered,—semi-liquid mud was found at one point only 6 feet from the surface,—have generally worked well. Since then the farm has been additionally provided for through a windmill system of pumping which was erected on the adjoining farm under the following circumstances.

The proprietor, in order to render himself independent of a water-supply district about to be formed in Errol parish, instructed a firm of Glasgow engineers to sink a bore which would provide for all the farms connected with this part of the estate, four in number. Operations were begun at the western foot of what is locally known as Ninetree Brae. At a depth of 65 feet the red sandstone was struck. The bore was continued through the red sandstone until a depth of 220 feet was reached; and as the water was now within 5 feet of the surface the supply was considered sufficient and the operations stopped. A concrete well was then built to a depth of 20 feet and a pipe inserted in the bore and forced down until it rested on the top of the sandstone rock. This pipe was afterwards found not to be sufficiently tight to exclude surface-water. Another pipe was then inserted inside it and the pumping apparatus connected with it. The pump is of what is known as the double-acting type—that is, it raises water in both the up and down stroke. The water is thrown into a 25,000-gallon tank erected about 300 yards away from the windmill, and between the two systems there is never any lack of water on the farm.

Fences.

Two kinds of fences are on the farm—one of larch stakes and the other of angle and T-iron. The latter are 5 feet 6 inches and 6 feet, turn about, in length, with a barbed wire on top and another in the centre. This, in Mr Bell's opinion, is the best fence that is made. It costs just now about 1s. per yard. An

experiment was made eighteen years ago in the creosoting of Scots fir and spruce for fencing purposes. The great bulk of these "posts" are still as sound as when they were put in, but owing to their soft nature they do not hold the staples well.

Rotations and Crops.

Mr Bell works the black land portion of his farm on an eight, and the clay portion on a six, course of cropping. The eight course followed is—1st wheat, 2nd turnips, 3rd barley or oats sown out, 4th hay, followed by two years pasture, oats, and potatoes. The six course on the other part of the farm is generally oats, turnips, barley or oats sown out, hay, and two years pasture. Formerly the clay land as well as the black land was kept in an eight rotation, but for some years one division of this has been kept in permanent pasture, while another division has been laid down to timothy, for which, being damp in the bottom, it is very well adapted. The timothy is sown out with an ordinary grain crop, and in the second year usually averages fully 2 tons per acre.

This is not the ordinary rotation followed in the Carse of Gowrie, but Mr Bell, with the consent of his landlord, was led to adopt it about twenty years ago on account of the unprofitable nature of grain-growing, and in order to reduce the working expenses of the farm.

Farmed on these lines fully the half of South Inchmichael is usually grass—one, two, and three years old. As a matter of fact, last year grain and green crops together only extended to 75 acres as compared with over 80 acres in hay and grass of one kind or other.

In putting in his grass seeds Mr Bell likes to sow them among oats, as he finds that they come up better after these than after barley.

The kinds of oats grown for the past few years have been Waverley, Storm King, and Tartar King—three new varieties introduced by the Messrs Garton. Mr Bell has had experience of Tartar King for four years. It requires to be sown from a bushel to a bushel and a half thicker per acre than the old varieties, but the yield, both on black land and on clay, has always been heavier—from $8\frac{1}{2}$ to 10 quarters per acre as compared with $6\frac{1}{2}$ to 8 quarters in the case of most of the old varieties. The straw, however, unless the oats have been early cut, is not as a rule so good. Waverley and Storm King have also done fairly well on the farm. In pickle they very much resemble Tartar King, and the yield is also about the same; but they are more liable to go down.

The past year was a very bad one for all the new varieties.

They require to be cut earlier than some of the old varieties like Sandy, and as this was not practicable owing to the season a good deal of shedding took place. It was also noticeable that the new varieties, owing to excess of moisture, showed a marked tendency to send up a second growth from the roots. The points, as a rule, in favour of the new varieties are their increased yield; their drawbacks are their liability to shed unless cut early; and the straw is not, as a rule, so good as in the case of the old varieties.

Mr Bell has also had experience of most of the new varieties of both wheat and barley, some of which have done well with him. The land here seems to be peculiarly well suited for barley. While other grains have to be changed every three or four years, barley may be sown time after time without fear of deterioration.

Beans on Carse land are usually also grown in an eight rotation, but Mr Bell has given up this crop on account of its uncertainty, the lateness of the harvest, and the generally dirty state in which a light crop leaves the land.

Turnips.

Mr Bell is a very successful grower of turnips, as the records of the local Carse Cup abundantly testify. Last year (1903) he was first for yellows in a strong competition, while he has several times got prizes for best managed crop. The varieties grown for the past four years have been—for an early swede Best of All, and for a late swede Eclipse and X L All. For an early yellow he generally favours a big-bulbing variety like Sutton's Centenary or Fosterton, a small portion of hard Aberdeen yellows being usually grown for late use. In good years swedes and yellows generally run to 30 tons per acre, but last year the crop was a light one all over the district, and the yield would be short of this by at least 8 tons.

Potatoes.

The potatoes grown for the past few years have been Scottish Triumphs, but this last year Up-to-Dates, Dundonald, Empress Queen, and Evergood were added as an experiment. Empress Queen and Dundonald were the best crop, both yielding a third more than either Up-to-Date or Triumph, while they were very free of disease. The past season was a very unsatisfactory one for potatoes in the district, the average yield not exceeding 5 tons per acre.

Seeding.

The quantity of seed allowed per acre for the cereal crops is generally about 4 bushels of wheat, $2\frac{1}{2}$ to 3 bushels of barley, and 5 to $6\frac{1}{2}$ bushels of the new varieties of oats. Old varieties of oats about 4 bushels. Mr Bell is an enthusiast on the subject of grasses, and has given them lengthened study. The mixture sown for some years for hay and two years' pasture is as follows, per acre:—

- 16 lb. perennial ryegrass ;
- $\frac{1}{2}$ bushel Italian ryegrass ;
- $\frac{3}{4}$ lb. each cow-grass and red and white clover ;
- 1 lb. each alsike and yellow clover ;
- 1 lb. cocksfoot ; and
- $1\frac{1}{2}$ lb. timothy.

Only seeds of the highest class obtainable are bought, and samples are examined under the microscope before being purchased. Mr Bell has not had such a long experience of timothy meadow-making, but the following is his mixture per acre:—

- 16 lb. German timothy ;
- $1\frac{1}{2}$ bushel Italian ryegrass ;
- 2 lb. each white clover, cow-grass, and alsike ; and
- 1 lb. yellow clover.

Times of Sowing.

Sowing at South Inchmichael begins with wheat, which is put in in the month of October, as soon as possible after the potatoes have been lifted. Last year, however, it was nearly the end of November before the work could be overtaken. Oats after lea are sown early in the beginning of April. Then comes barley after turnips, and this is followed by oats after green crop, because they come earlier than after lea.

Potatoes have hitherto not been planted until all the grain was sown ; but Mr Bell thinks that possibly this is a mistake, and by another year is to try the experiment of planting earlier, his general experience having been that early planted potatoes give the best results.

The earlier varieties of swedes are usually sown during the first fortnight in May, the other kinds following as soon as they can be got in. Mr Bell likes even the yellows to be sown by the end of the third week in May.

Cultivation.

Mr Bell's practice in regard to cultivation has been to empty the courts of manure on to the stubbles as soon after harvest as

possible; but last autumn, owing to the late season and the fields not being cleared, it was necessary to cart out the manure into heaps so as to allow of the stock being housed by the third week of September. This manure has been lying since the beginning of February, and is in a rich state owing to the large quantities of cake used,—nearly a rent for some years back having been spent every year on cakes and feeding-stuffs. The manure is spread on the stubbles at the rate of 15 to 18 tons per acre, and is allowed to lie until the month of January or February, when it is ploughed down by American ploughs to a depth of about 7 inches. As soon in March as the weather permits the ground is harrowed and rolled and again ploughed,—sometimes crosswise and sometimes in the same direction, as circumstances suggest.

Potato-Planting.

When potato-planting time comes round the land is again either turned with the chilled plough or stirred to the required depth by grubbers. When brought down to a suitable state of division—Mr Bell likes plenty of slack earth with a “clod” in it for potatoes—the drills are opened by double-furrow ploughs, the artificial manure sown, and the potatoes planted and covered. After the sets have been down for about a fortnight or three weeks, a drill grubber or cultivator is passed through the drills to loosen the soil and destroy weeds. Circular harrows are also put over the drills for the same purpose, and the potatoes are then again earthed up. Then they are left until they are almost braided, when the circular harrows are again put through them to break the surface and destroy any weeds that may have sprung up.

When the young plants are sufficiently well through the ground they are hand-hoed and earthed up for the first time. In about a fortnight or three weeks they get another grubbing, and then they are finally earthed up, which is done either by a cultivator with the moulds on or by a plough made for the purpose—the latter, as a rule, doing the better work.

Turnip Culture.

Preparing the land for turnips is a more intricate business. If the land be dry and “clods” hard, Mr Bell generally puts an iron roller, followed by a stone roller, over it, these in turn being succeeded by a four-horse grubber, a light broad-toothed grubber, and a cultivator. But should the soil be sour, it is ploughed, dried, grubbed, cultivated, and rolled, this being frequently done bit by bit so as to keep in as much of the

natural sap of the land as possible. The manure is then sown on the surface and the land immediately drilled, the drills being compressed if necessary by the dull-roller and the turnip-seed sower. If the weather be hard and dry the drills are further compressed by the drill-roller or by the iron land-roller.

Nothing more is done to the turnip crop until the plants are ready for singling, when the Hunter hoe or the drill-grubber is put through them. After being singled they are grubbed first and then cultivated a sufficient number of times to ensure that all the weeds are destroyed.

Since farmers' clubs began to take an interest in turnip-growing, much more attention in this part of the country has been given to such matters as the width of the drills, the width between the plants, and the selection of seed. The former practice was to have turnip-drills any width between 28 and 32 inches. But the competitions have shown that the best results are obtained from a drill varying from 24 to 26 inches wide, with the plants singled from 10 to 12 inches.

Where nitrogenous manure has not been given at the time of sowing, nitrate of soda is applied about the end of July or beginning of August, as at that period turnips show a tendency to mildew, and the effect of the stimulant is to carry them past that stage.

Culture of Grain Crops.

For white crop the land is neatly ploughed in the usual way—a turn of the harrows, and sometimes of the cultivator, being frequently given before the seed is put in. It has been Mr Bell's experience, however, that for oats, at any rate, the depth of the mould at sowing-time is not such an important factor in the yield of crop as is generally supposed.

A peculiarity in the case of the wheat-land is that, after being autumn or winter sown, it is harrowed once or twice and rolled in spring just after the growth has begun—generally in the month of April.

Wild Mustard.

One of the greatest scourges complained of at South Inch-michael and district is wild mustard. The plan adopted for lessening it is to harrow the oats whenever the mustard plant forms its two leaves. This has the effect of destroying the plant, and it often at the same time assists the growth of the crops; but the ground is so full of the seeds of the weed that it can never be wholly eradicated. Last year experiments were made under the auspices of the Carse Farmers' Club in the destruction of mustard by spraying, the mixture used being

15 lb. of spraying powder, consisting of sulphate of copper, with 10 per cent of ground lime added to 45 gallons of water. This was applied per acre. The plants at the time were about 3 inches in height, some of them beginning to flower. The experiment was quite successful, not a plant being left. The cost was 8s. per acre.

Manures and Manuring.

In addition to the farmyard manure, Mr Bell applies a considerable quantity of artificials every year. The mixture usually applied is $\frac{1}{4}$ cwt. nitrate of potash; $\frac{1}{4}$ cwt. sulphate of ammonia; 4 cwt. 35 per cent superphosphate; and $1\frac{1}{2}$ cwt. sulphate of potash 50 per cent strength. The mixture is applied to all the crops alike,—hay, turnips, and potatoes,—but grass-land only gets about half the quantity.

Hay-Harvest.

Hay-harvest at South Inchmichael begins about the end of June or beginning of July. The hay is all cut by mower, and is handled as sharply as possible, only a few acres being cut at a time, to avoid risk of bad weather. It is put into tramp coles of 50 to 70 stones, and when sufficiently dry is put into stack.

The aftermath is first pastured with cattle and then with sheep.

Grain-Harvest.

Grain-harvest depends on the season. The earliest date of starting shown in a record kept since 1849 was August 4 in the years 1867, 1868, and 1887, and the latest September 26, the year being 1879. In the last two years it has been September 8.

Potato- and Turnip-Lifting.

Potato-lifting takes place from the first to the third week of October, and turnip-storing from the beginning of November onwards.

Mr Bell follows three methods in storing his turnips. The first is to drive them off the field into square pits 3 to 4 feet in height. The advantage of this system is that it occupies comparatively small space, the pits can be easily covered, and there is little damage from frost. The drawback is that in a winter of higher temperature than usual a heat may take place and a portion of the turnips be damaged. The second method is to throw them into heaps of about one cartload each on the field and cover them with a sprinkling of shaws and earth. The

advantage of this method is that the turnips can be readily lifted whenever the ground is hard enough for carting. They also come out very fresh from these pits; but a disadvantage is having to remove them in spring when work otherwise is congested.

An alternative method is to cart the turnips off the land as in the first plan and put them in a pit resembling a potato-pit. This method prevents heating, but offers a larger exposure to frost and is more difficult to cover. As a rule the land in this neighbourhood is too flat for "sheughing." Where it can be followed, however, "sheughing" has its advantages: a larger area of roots can be stored in this way in a shorter time than by almost any other method. With one plough up to 3 acres per day can be overtaken by "sheughing," and the turnips come out very crisp and fresh in spring.

Live Stock.

Mr Bell's usual rule is to have about three bullocks per acre of turnips. Generally speaking, he buys all the cattle he requires, feeding for most part well-bred Irish animals. The average stock on the farm in winter, including two or three dairy cows, is about fifty head. The small breadth under grain, and the consequent scarcity of straw, necessitates the purchase of a large quantity of mill-dust as bedding material.

Of the cattle a number have been brought in from the pastures to finish and others bought to feed over winter. Those brought in from the pastures are usually sold from the middle of November to Christmas. The wintering cattle are, according to the season and prices, either fed off at once or put out to the pastures in spring in sufficient condition to be finished in a few weeks.

The usual practice in feeding is to give about 40 lb. of sliced roots twice a-day along with, for fattening cattle, 4 to 8 lb. of linseed- and cotton-cake mixed, the cotton-cake being lessened and the linseed-cake increased as the animals advance in condition.

Wintering cattle, on the other hand, usually get 3 to 5 lb. of cotton-cake along with the same quantity of roots, both classes having straw *ad lib.* During the past winter, owing to the deteriorated fodder, a large quantity of hay as well as grain was fed to cattle.

On the winter pasture it has also been Mr Bell's practice for some years to keep from three to four score of breeding ewes, and to lamb the ewes in spring and sell off both fat in summer. The ewes get a few turnips before they lamb. When being fed they get either oats or cotton-cake, and if early lambs are

wanted a mixture of oats, cake, and Indian corn in addition to the grass. Mr Bell believes in the practice of eating considerable quantities of cake and feeding-stuffs on grass; but he prefers to get the cost of the cake from the animals themselves rather than depend too much on the increased manurial value of the land.

Labour.

Three horsemen and a cattleman form the regular staff on the farm, although women are employed for threshing (which is done by steam), turnip- and potato-lifting, and the like. Turnip-lifting done by piece costs from 10s. to 12s. per acre; potato-lifting from 20s. to 25s. per acre—both representing a substantial increase within recent years. Harvest work, on the other hand, was probably never done more cheaply, the extra cost being little more than the cost of twine and the wages of an extra forker—about 4s. 6d. per acre in all. Besides perquisites, men-servants get about £40 a-year in money. Women get 1s. 6d. a-day at ordinary times; 4s. a-day in harvest; and 2s. a-day at potato-lifting.

Mr Bell has to buy all his horses. The work is too heavy for brood mares, and there is no outrun for young horses.

In concluding, it may be said that Mr Bell has a very commodious and well-arranged steading, and that he does not neglect the smaller things of the farm, the poultry-house at South Inchmichael being a model of what a building of the kind should be.

BARNs OF CLAVERHOUSE, DUNDEE.

It is not a far cry from South Inchmichael to Barns of Claverhouse, Dundee, where Mr W. F. Bell holds sway—or part of it at any rate—as one of the largest farmers in central Scotland. Mr Bell belongs to a family which have long held a dominant position as farmers in this part of the country. At the present time he holds no fewer than five farms—three in Forfarshire and two in Fifeshire. The Forfarshire farms are Barns of Claverhouse and Mains of Fintry, close to Dundee, and Hatton Mill, near Friockheim. The first two, which are rented in order from the Earl of Home and Mr Erskine of Linlathen, extend respectively to 400 and 250 acres, and the last, which is leased from the Earl of Dalhousie, to 560 acres. In Fifeshire Mr Bell farms Foodie and Luthrie Bank, near Cupar, both of which he acquired by purchase a few years ago. Foodie extends to 400 acres, and Luthrie Bank to 350 acres, so that his total holding is very close upon 2000 acres. With the exception of

Foodie, which is kept in grass, all the farms are arable, a circumstance which in these times adds not a little to the difficulties and responsibilities of management.

General Systems.

Although concerned for the most part at present with Barns of Claverhouse, a brief reference may be made to the system of farming which Mr Bell follows on his other farms. Hatton Mill, which is one of the largest and best farms in its district of Forfarshire, is managed as an ordinary cropping farm, not specially favourably situated for markets, and depending in large measure for its revenue on current produce prices. Practically only the ordinary crops are sold off it. The rotation maintained is a seven—viz., 1st and 2nd grass, 3rd oats, 4th potatoes, 5th wheat, 6th turnips, and 7th barley. This is exactly the same rotation as is generally followed at Barns of Claverhouse, with the exception that there no barley is grown.

At Hatton Mill the turnips are consumed by lambs and cattle bought for the purpose. The former are purchased, as a rule, in September, and put on to foggage, after which they go on to turnips. They get hay and a moderate allowance of artificial food, and go away whenever fat. The cattle used are mostly Irish, bought in the autumn and spring. Those bought in the autumn are fed during the winter on turnips and straw and a mixture of cakes—linseed and cotton. The spring cattle are fed on the grass with cake, getting 8 lb. of the latter per day—half linseed- and half cotton-cake. These cattle are always three-year-olds. They cost from £14 to £18, and would require to leave £5 per head for their keep until September or October, but rarely do it. This is where one of the disappointments of this class of farming comes in, store cattle of late years having frequently been so high in price as compared with fat ones that they could hardly be bought to leave a profit.

The feature of the farming followed at both Foodie and Luthrie Bank is the maintenance on each of a flock of ewes for breeding early lambs. The ewes are mostly crosses, and they are put to Border Leicester rams as a rule. The system is so worked that the lambs begin to arrive very shortly after the 1st of January and begin to go away towards the end of April or 1st of May. The prices realised reach as high as 50s. per lamb in the first of the season, and the average rarely falls below 35s.

The flocks of breeding ewes are managed on something like the following lines:—At Luthrie Bank Mr Bell tries to save as much grass as possible for winter keep, giving the ewes turnips and cake in spring after lambing. At Foodie, which is

a fine early grass farm, the ewes are kept on the grass all the year round, the lambs just taking their chance with their dams, but of course the grass is not eaten bare in autumn. In the first week of February this year Mr Bell had 200 lambs, and they were simply living on the grass with their dams. Only about one sheep is put on to the acre, and the lambs are made fat without any artificial feeding, unless perhaps to put through a snow-storm. The ewes get 1 lb. of linseed cake each a-day at lambing time, but this is stopped the moment there is plenty of grass. At Foodie all cake is given to cattle on the grass, and the sheep are mixed with the cattle to the number of one ewe or lamb, or at the very most one and a half ewes or lambs, to the acre.

Mains of Fintry, like Barns of Claverhouse, which it adjoins, is almost entirely worked as a Dundee selling farm. Practically everything is sold that will sell, but in return enormous quantities of manure—cow and horse manure, besides artificials—are brought back. The amount of the cow and horse manure alone applied reaches annually as much as 30 to 35 tons per acre of the green-crop land. This manure is mainly bought from Dundee dairymen (who purchase the growing crops), and including the cost of cartage costs not less than £10 per acre laid down on the land.

A Selling Farm.

This style of farming will, however, be best understood from what follows in regard to the system pursued at Barns of Claverhouse. This farm has been in the hands of Mr Bell's family for about a hundred years, and has for long been mainly devoted to the growing of crops for the Dundee dairymen. This, in fact, is now its chief function, only sufficient cattle and sheep being kept to eat up extras. It cannot be said that the farm is specially well situated for the purpose, a large proportion of the land being very steep. It is also three miles out of Dundee, and the roads are heavy both ways; but notwithstanding this Mr Bell has established a very large business as a selling farmer, his total rent for Barns and Mains of Fintry alone being over £1400.

Once at Barns, the farm is a very desirable one, and it is admirably set off by an excellent dwelling-house and set of farm buildings, which were, partially at any rate, erected by Mr Bell's father, who resided here up to 1877, when he took Mains of Fintry and removed to it.

Character of Soil.

At Barns of Claverhouse the land is of two classes, one-half being easy black loam on a subsoil of gravel, and the other stiff

loam of a pretty similar class, but on a clay bottom. Both rest ultimately on the blue whinstone rock. The farm was admirably drained in the time of the present occupant's father with ordinary tiles, and although the drains are at least fifty years old they are still in perfect working order. The cost at the time the drains were put in—they were laid 6 yards apart—would be about £5 to £6 per acre, equal to £8 to £10 now. The drainage was entirely done by the tenant.

The farm is also very well fenced by stone dykes, wire fences, and hedges. The wire fences cost about 1s. per yard to erect.

Rotations and Tillage.

As indicated, the farm, so far as rotations are concerned, is worked on seven shifts,—no barley, however, being grown. The grass seeds for the two years' grass are sown out with oats. Tillage is a very important matter on this class of farm. With Mr Bell this operation, so far at any rate as the potato and turnip land is concerned, begins in the autumn of the previous year when the long manure is carted on to the stubbles as soon as the preceding white crop has been removed. This manure is usually Dundee cow manure with the addition of what is made on the farm. It is spread on the surface of the land at the rate of 30 to 35 tons to the acre—rather less is applied when it is good farmyard manure—and is then ploughed in. This work is done as soon as possible, but sometimes the manure may lie for weeks should an unfavourable turn of weather set in. Ploughing is usually done at a depth of 9 to 12 inches.

The land lies in this state until spring, when it is harrowed. On the lighter land one turn of the harrows is frequently sufficient to form a good mould, but on the stiff kinds it has often to be grubbed as well, and occasionally ploughed a second time. In these cases the harrows are put over it a second time also. All the weeds thrown up by the harrows are collected, but as a rule, on land farmed as closely as this is and so heavily manured, weeds are not superabundant. Last year, owing to the excessive amount of wet, they were much more numerous than usual.

Potatoes.

Potatoes are planted as soon after the first of March as possible when the land is in condition. The drills are opened and shut by means of ordinary double-furrow ploughs, the sets being usually planted whole and 12 to 15 inches apart. No artificial manure whatever is applied to this crop.

After the potatoes have been planted they are left for about a month, when the drills are harrowed down again by heavy

iron harrows. This is done to bring the sets nearer to the surface and give the young shoots a better chance, seeing that no dung has been applied in the drill. The harrowing down is also found to be a great advantage on this class of land so far as hand-hoeing is concerned, as the weeds do not come up so badly. Immediately after they are again earthed up and harrowed down a second time, the latter being valuable for keeping the land clean.

Nothing more is done until the potatoes appear above the ground, when they are hand-hoed. Then they are grubbed between the drills after a week or two, and earthed up whenever they are sufficiently advanced to permit of it. But Mr Bell likes the shaws to be fairly close on the drills before this is done.

Lifting potatoes starts, as a rule, early in October, and generally lasts until the first of November. The work is done by diggers, which work well on the bulk of the land of the farm, and Mr Bell prefers them to the plough; for, although the digger may chip a few, more potatoes are actually secured than by the use of the plough. Twelve gatherers are usually apportioned to each digger, working from one side. The cost of lifting and pitting is usually about £1 per acre, not including the cost of horses' labour and the wages of the regular men. The potatoes are put in pits about 5 feet wide, trimmed up to about 4 feet 6 inches in height. This, it is calculated, will hold about 20 cwt. of potatoes per pit yard. Contrary to Mr Ferguson's plan, Mr Bell sells his potatoes largely according to the state of the markets. In his early farming days, when the import duty into America was only £1 per ton, Mr Bell did a good deal in exporting potatoes to that country; but now, with the American duty standing at £2 per ton, it is rarely ever possible to export potatoes.

The quantity of potatoes usually grown per acre is 6 to 8 tons, although it was below that last year, potatoes last season being a comparative failure in the Dundee district on all heavily manured land. The prices received usually run from £2 to £4 per ton. The crop is not reckoned a profitable one unless it commands about 60s. per ton at least.

Turnip-Growing.

Turnips are taken in hand after the potatoes have been planted, and this, of course, is one of the great earning crops of the year in this class of farming. The turnip-land gets pretty much the same treatment as regards manuring and working as the potato-break. It is top-dressed in the autumn with the same quantity of cow or farmyard manure, and is also

ploughed and harrowed or grubbed and second ploughed just as that land was. A difference in favour of the turnip crop is, however, that it gets in addition to the stubble manuring a dressing in the drill of a special turnip mixture, 4 cwt. being applied per acre. The drills are opened and closed with the double-furrow plough in the usual way, and the seeds sown by an ordinary one-horse drill sower. The quantities sown are usually 6 lb. of swedes and 4 lb. of yellows to the acre.

Nothing more is done to the crop until the braird comes through, when they are singled at a distance of 9 to 12 inches. The width of drill favoured is usually 28 inches. After the turnips have got over singling, single-horse hoes are put through them as often as necessary to keep down weeds. Hand-hoers are also put through them a second time to clear up anything that may be left about the roots. Then they get a deep grub in the bottom of the drills and are earthed up just before the shaws close on top.

The turnips are sold to the dairymen as they stand at so much per acre. As a rule they make from £16 to £24. These are higher prices than are usually current even in the Edinburgh district where the city and suburban cow population is much greater; but Mr Bell has to do all the carting, which is a very heavy item on a difficult road, and mostly, as it happens, in the winter season. The manure bill, as stated, also amounts to something like £10 per acre in itself, and this has to be carted from Dundee, so that with loads both ways it means heavy wear and tear on both horses and material.

Horse-Power.

Although there are really only 350 acres suitable for cultivation on Barns of Claverhouse (the other 50 acres are taken up by woods, roads, fences, &c.), it requires fourteen strong active horses to work it, and as Mr Bell calculates that every pair of horses costs him £150 a-year, it can easily be seen where the extra expenditure comes in. In the same way ten horses are required for the Mains of Fintry, although the acreage is but 250 acres.

Cereals.

For oats after turnips the land is ploughed as soon in spring as the turnips have been cleared. No harrowing of this land is required, as a rule, before sowing the oats, but after they are sown the land is carefully harrowed and rolled. Wheat is sown in the autumn after potatoes. This land is treated much in the same way as regards harrowing and sowing as the oat-land, nothing usually being required after ploughing until the crop

is sown. Ploughing is done to a depth of 9 to 12 inches, mainly by ordinary high-cutting ploughs or American chilled ploughs. The latter are rather favoured for stubble work, the land usually being better broken up than with ordinary ploughs. No artificial manures are applied to the cereal crops.

The times of sowing the different crops depends on the season, but Mr Bell does not like the potatoes to be very much later than the middle of March, and turnips as early in May as possible.

Harvesting of the whole of the cereal crops is done by binders where they can work, but on some of the steep land reapers have to be run. Last year the scythe, and even the hook, had to be requisitioned again. As a rule Mr Bell employs as many people all the year round as are requisite for the harvest. The cost of harvesting is usually reckoned with him at about 10s. per acre, although this year it cost up to 25s. per acre.

Grass.

Grass under this cropping is a very important part of the rotation. It is sown out with oats, the mixture usually employed being 1 bushel perennial ryegrass, $\frac{1}{4}$ bushel Italian, 8 lb. English red clover, 3 lb. cow grass, 3 lb. alsike, and 3 lb. white clover per acre. The whole of the first year's grass is sold for dairy purposes, the very earliest parts being cut three times. Prices run from £16 to £20 per acre, Mr Bell again doing the carting. One cwt. of nitrate of soda is applied every year about the first of March to the Scotch acre, but as a rule it requires no more, the land being in sufficiently high condition in itself to yield fair crops.

The grass is pastured the second year with about fifty Irish three-year-old bullocks—one bullock to about an acre. These bullocks are bought in November and wintered on refuse potatoes, straw, chaff, and any odds and ends, but no turnips are ever given. They get 4 lb. per day of cotton-cake (Bombay) when all other foods fail; but they are always made easiest fat on the grass, when they get 28 lb. per day of refuse potatoes up to 1st February, and 56 lb. per day up to grass-time, and no cake; then 4 lb. of cotton-cake on grass up to 1st July, and 8 lb. to 1st September. This food generally makes them quite fat. If the grass be short and dry 4 lb. of linseed-cake is usually substituted for 4 lb. of the cotton cake from 1st September to the time they go away, which is during that month and on to October.

Labour.

Mr Bell is naturally a large employer of labour, land worked in this rotation and style of farming costing at least £2 per

acre for hand labour, independently of the very heavy cost all round for tear and wear of horses, carts, and implements. The staff regularly employed at Barns of Claverhouse numbers as many as seven horsemen, one grieve, one cattleman, two orramen, three boys, and three women workers. Since Mr Bell started farming in 1877 wages have advanced exactly one-third. At that time good average ploughmen got £20 to £25 a-year with a house and the usual perquisites, consisting of meal, milk, and potatoes. Now they get £30 to £35 in addition to perquisites. These latter consist of at present $6\frac{1}{2}$ bolls of oat-meal a-year, 30 poles of potato-ground, and $1\frac{1}{2}$ pint of milk in summer, and 1 pint in winter. Boys get 10s. per week, and women workers the same rate, as a rule, although in harvest they get an extra sum of 30s., and at potato-lifting 12s. a-week. Mr Bell has very little trouble with his workers. Several of his men have been with him up to twenty years, and there are few changes as a rule.

In the neighbourhood of Dundee for some time back farmers have had an experience in the matter of labour which must be unique. Since the jute and iron industries began to get depressed and the hands were turned on to short time, numbers of men, feeling dissatisfied, have been slipping out to the country and taking up farm work. Many of these men came originally from the country, and were consequently not unacquainted with farm labour. The result of this migration has been that farmers near the city have been well supplied with workers; in fact, many of the ordinary farm hands when they have thrown up their situations have had difficulty in getting re-engaged, and have had, in some cases, to go to other districts. Of course it is quite possible that a spurt in the jute trade, and in industry generally, might draw many of these people back to the town; but a number, and especially of married men, are known to be so tired of the precarious conditions under which they existed in the city, that it is confidently expected a considerable proportion of them will settle permanently where they are.

DALACHY, ABERDOUR.

Mr Cunningham's farm of Dalachy, Aberdour, is not so well adapted for bumper crop-growing as the other farms to which we have been referring. Such as it is, however, it is managed with great skill and enterprise, and as a stock-raiser Mr Cunningham has a reputation which is not confined to the county of Fife. His farm is probably unique in that it is self-supporting alike as regards cattle and sheep. He is thus wholly outside such questions as Canadian and Irish stores; the only thing

that affects him being, as he says, the occasionally low prices going for fat cattle and sheep. But even here he has this advantage over many of his neighbours, that whatever prices are current he gets the full benefit of them; for, raising all his own stores, he has only a rearing and not an in-buying bill to deduct—a very different thing lately.

General Features.

The farms of Dalachy and Balram—for there are really two farms in the holding, although Mr Cunningham works them practically as one concern—extend altogether to 593 acres. Of the total, 162 acres are in permanent pasture, 140 more or less in rotation grasses, 15 in meadows, cut yearly, and 276 under rotation of crops. The farms form an isolated property of the Earl of Morton in the Aberdour neighbourhood, and have been in the hands of Mr Cunningham's family for many years, having been occupied by his father and grandfather before him. They occupy a commanding position on the crest of the hill between Burntisland and Aberdour, extending practically from the Firth for a couple of miles back. From the front door of the house—a specially good house of its kind with a nicely laid off pleasure-ground in front—magnificent views are got both up and down the Firth of Forth, while on the opposite side are easily defined the grim outlines of Edinburgh Castle and the green slopes of Arthur Seat above Holyrood Palace. Few more enchanting prospects on a clear day are to be seen anywhere.

Both farms lie mainly on the whinstone rock, some of the land as might be expected being very near to it. On the farthest back portion of the farm there are some fields of strong poor clay, but on the south side next the Firth there is a stretch of nice, sharp, useful land, where Mr Cunningham can grow potatoes or oats with the best of his farmer friends.

The strong clay side of the farm was drained about thirty years ago with drains $3\frac{1}{2}$ and 4 feet deep with $2\frac{1}{2}$ -inch pipes running into 4-inch leaders. These worked well for a long time, but some of the fields would now require re-draining, especially those which have mossy deposits in the low-lying parts of them.

The cattle-courts are partly covered and partly open, the latter being considered more suitable for the younger cattle. Straw and turnips are all under cover. There are two steadings on the farm, and they are both roomy and convenient.

The farm is mostly fenced with stone-and-lime walls 4 to 5 feet in height, with a few divisional wire-fences. The stone dykes were erected in the days of Mr Cunningham's father, when times were very different from what they are now. The dykes are still in excellent condition.

Rotations and Crops.

On the best land of the farm the six shift rotation is pursued. The same system is also followed on the higher and secondary land, with the exception that this division lies three years in pasture before being again broken up. There being so much grass otherwise, no part of the lower and better division of the farm is pastured. The usual six-course rotation followed is potatoes, wheat, turnips, barley, hay, and oats, modified, as already stated, on the higher part of the farm by three years grass. On the high part of the farm no potatoes or wheat are grown.

Last year the proportions of the various crops laid down were potatoes 30 acres, wheat 35 acres, turnips 73 acres, barley 50 acres, hay 25 acres, and oats 80 acres—total 293.

The yield of the different crops depends on the season, but on the lower division of the farm wheat averages about 5 quarters per acre, barley 5 to 6 quarters, and oats about 6 quarters. On the higher parts oats and barley will be a little less.

The quantities of seed sown also depend to some extent on the season and the tilth that has been got. With the older varieties of grains about 4 bushels wheat, $3\frac{1}{2}$ bushels barley, and 4 to 5 bushels oats per acre was the general quantity allowed; but with the newer varieties a much more liberal seeding is required to give a satisfactory return. For hay, 3 pecks or $\frac{3}{4}$ of a bushel Italian and 2 pecks of perennial ryegrass, with 4 lb. each of cow's-grass and best English red clover, are sown per acre. For pasture the mixture usually is 4 bushels perennial ryegrass, 1 to 2 pecks of Italian, 8 lb. of the various clovers, and 6 to 8 lb. of cocksfoot and timothy. All grains are sown by hand; grasses and clovers by machine.

Cultivation.

Mr Cunningham is very particular about the working of the land for the various crops. Care is taken at all seasons never to go upon it for this purpose unless the land is in thoroughly good condition. This precaution is specially necessary in the case of the strong land, which may be quite easily spoiled practically for the season by being worked when it is not in condition. All land intended for green crop is ploughed deeply, thoroughly, and efficiently from the stubbles in the autumn and allowed to lie exposed to the weather throughout the winter. The first care in spring when the different

grains are being sown is to see that the land is first in condition before going on to it, and then to reduce it with whatever implements are most suitable to as fine a tilth as possible, the barley-land especially. In working the land for turnips, unless the land be very strong and clean, it is always cross-ploughed, which cuts all weeds, care being taken if the weather be dry to roll down close behind the ploughs, as it is found that this goes far to secure a good braird. It is rarely necessary at Dalachy when the land has been worked in this way to have to sow turnips a second time.

Manures.

Mr Cunningham's manurial treatment of the potato crop is generally on the following lines. In autumn before the land is ploughed it is liberally manured from the courts with from 20 to 25 tons per acre of farmyard manure. After being ploughed it gets a dressing of 4 to 6 cwt. per acre of kainit salts, and at the time of planting a further dressing of 1 cwt. sulphate of ammonia, 3 cwt. superphosphate, and 1 cwt. bone-flour per acre. Scarcity of manure for the breadth usually prevents a part of the turnip-break being dunged on the surface; but it gets a good half dunging in the drill, and in addition 6 to 7 cwt. per acre of artificials, consisting of sulphate of ammonia, superphosphate, bone flour, and kainit salt, but only the latter if it has not previously been applied during winter on the surface, which is generally done. Capital crops of both turnips and potatoes are grown under this treatment. At the time of our visit to Dalachy in November 1903 Mr Cunningham was lifting a crop of Up-to-Date potatoes which were estimated to yield at least 10 tons per acre. The turnips on the farm also looked exceedingly well.

Potatoes.

Potato sets are generally planted about 15 inches apart in a 28-inch drill. For seed good-sized "seconds" are preferred to cut seed. The drills are opened and closed with an ordinary double-furrow plough. A short time after the potatoes have been planted the drills are circle-harrowed down, grubbed, and run up again, the Wallace cultivator being found very efficient as well as speedy for this operation. The effect of this working is generally to effectually check any growth of annual weeds which may have set in by this time. Just before the stems come through the ground the drills are circle-harrowed down again and deeply grubbed with a two-horse grubber. The young plants should then be ready for hoeing, after which they are

grubbed again, when all weeds should have disappeared. They are then finally earthed up, care being taken to leave a good shoulder on the drill to give room for the growing tubers to swell.

Potatoes are generally raised by the forked plough in preference to the digger. On this class of land Mr Cunningham is quite convinced that the plough does better work than any digger. The crop is pitted in $4\frac{1}{2}$ feet pits, which are liberally covered with good dry wheat-straw and then with a fair covering of earth, a ridge being left along the top for ventilating purposes. Like Mr W. F. Bell, Mr Cunningham sells only when he thinks he has the best of the market.

Turnips.

Turnips are sown on the drill in the usual way. As soon as the young plants are ready for thinning the drills are grubbed or scarified with a Hunter hoe. The plants are then carefully singled about 15 inches apart, care being taken that no doubles are left. When nearly ready for hoeing they are again grubbed, then hand-hoed, and after a short interval receive their last grubbing. Some people give them a run up with the plough at this stage, but Mr Cunningham does not think this necessary on his land. If the season has been fairly favourable for them the plants should by this time be closing in the drills and able to look well after themselves.

As soon as the potato harvest is over all hands are generally employed pulling and storing the turnip crop. In this work it is good and safe management, in Mr Cunningham's experience, to keep the carts driving close up to the pullers, so as not to be caught by frost, snow, or even by wet weather. Nothing in his experience is more against the keeping of turnips in pits than to store them with frost or "rime" on them.

For consumption by cattle the turnips are put into ordinary long pits and covered with plenty of "brock" straw. For sheep they are put into round pits of about four cart-loads each, and covered with a little straw and earth. Some people cover turnips for sheep with earth only, but the straw keeps them cleaner in wet weather, and they prove in consequence more nutritious and palatable to the animals.

White Crops.

Cultivation for the white crops generally follows established practice. Lea land is usually ploughed in the autumn or through the winter. Red land, on the other hand, is ploughed in the spring and the crop sown shortly after. But if the

tilth in either class of land is not considered fine enough the land is harrowed down until it gets to the required state of division. On stiff land this work is oftener necessary than on the lighter parts of the farm.

Harvesting.

Harvesting begins with the hay, which is cut by the mower when the bloom is seen to be full out on it. Thereafter it is handled as quickly as possible, being put into bossed ricks right out of the swaith. This method is found to answer quite as well as the old plan of coling it first, and besides saving labour it puts the crop into safety at once. This arrangement of handling the hay is, however, not so handy for the hay-trolleys and horse-forks in use on some farms. The aftermath is consumed by lambs after they are weaned.

Grain harvesting begins as soon as ever the grain is ripe enough,—last year it was 7th September,—oats and wheat being always taken sharp, especially if the season be a late one. Barley, however, must be well ripened if top prices are expected for it. All grain is cut by binders, the reaper being used only in the event of the crop being much twisted and laid.

Prices for the grain disposed of depend on the markets. In 1902 barley made from 22s. to 28s. and wheat up to 28s. 6d., but the grain of 1903 it is not of as good quality, and prices are lower.

Labour.

The staff necessary for working such a large farm as this is six ploughmen with a boy for odd horse, two cattlemen, one shepherd in summer and two in winter, one or two orramen, with six to eight outworkers, a farm grieve, and extra hands during harvest and potato-lifting. Ploughmen receive from £34 to £38 a-year in money, besides a free house and garden, 6½ bolls of oatmeal, one pint of sweet warm milk a-day, and 1200 yards potato-ground. They also get five weeks' food in harvest. Any members of their families fit for work get constant employment on the farm. Women workers get 2d. an hour during summer and winter, with extra wages during harvest and potato-lifting. At the former time they get equal to 3s. a-day, and at the latter equal to 2s. a-day. Thirty years ago women doing the same work got from 10d. to 1s. a-day, and men received from £22 to £24 a-year with the same perquisites.

Live Stock—Home-Breeding.

As indicated, a leading feature of Mr Cunningham's management is in the live stock department. From 60 to 70 bullocks and heifers and from 440 to 460 hogs are fed off every year, both classes being entirely of his own rearing. The system of rearing cattle at Dalachy is as follows: Apart from five or six dairy cows, each of which usually also produces a calf during the year, a breeding herd of twenty strong shorthorn cross cows is kept expressly for the purpose. These cows are mated with a first-class Aberdeen-Angus bull and are made to rear annually at least three calves apiece. Only one of these calves may be their own, the others being calves which have been bought in as newly dropped youngsters to put on to them. Thus when a cow calves—the regular herd are timed to calve in March or April—a newly bought-in calf is always held in readiness to go along with the cow's own calf. The cow suckles these calves on the grass all through the summer up to the 1st of September, when the calves are weaned and the cow supplied with another calf. This calf is usually kept in the house unless the weather is specially warm and the cow brought in two or three times a-day to suckle it.

By this time the cows (having suckled two calves throughout the summer) usually begin to get thin, and require a little assistance with the third calf. This is given them in the form of a little artificial food night and morning. Tares or second-crop clover is also very useful for this purpose. The third calf is generally finished off and weaned by the end of November, when the cows are allowed to lie over quietly until next calving, when they go through the same routine.

As a rule they require little more than good turnips and straw during the winter, but occasionally it is necessary to give backward ones a little cake or bruised grain to bring them forward for next season.

Carefully handled, this system works well in practice. But the cows must be good of their class and well selected, for it will not pay unless three calves can be reared to each cow kept. All cows, therefore, which prove uncertain breeders or bad milkers are fattened off and their places taken by selected heifers from the regular cast.

Great care is also necessary in the management of the young calves, especially at the very start. It is one of the penalties of having to buy newly-calved calves and have them forwarded by rail, that occasionally they develop either scour or cold in the lungs when they get home. Both troubles can be largely modified in their attack if the young animals get immediate attention; but if loss and disappointment is not to follow,

it is necessary that the master himself should keep a watchful eye on them and see that everything is being done that ought to be done. It will not do to leave work of this kind entirely to servants.

Another trouble which Mr Cunningham has lately had some experience of is fits in calves. The fits are mainly also confined to bought-in calves, and seem to temporarily paralyse the legs and nerves of the young animals. Occasionally a calf may get better after having had fits, but even when it does it usually turns out a small bad beast.

The great secret of success in rearing calves in this way is to keep them warm and prevent scour from getting in amongst them. Mr Cunningham had a good deal of trouble with all these matters when he first began rearing calves on these lines, but he has learned much in the interval, and through exercising the greatest care and attention does not now often lose a calf.

The calves when weaned are well cared for during their first winter, receiving about 2 lb. of linseed cake daily along with a fair allowance of cut turnips or cabbage, and good oat straw or meadow-hay for fodder. They are comfortably housed at night, and during the day get a run out to a well-sheltered pasture-field. During the second winter they are fed and sold fat in April or May of the following spring.

At Dalachy there are casts of these cattle coming on regularly every year, and Mr Cunningham is convinced that the system is a good one where (1) a convenient supply of nice calves can be got when wanted; (2) where the farmer has plenty of well-fenced and well-watered grass-land (this is an essential); (3) good, roomy, comfortable buildings for wintering purposes; and (4) can give close personal attention to the calves during the first season.

Sheep.

The sheep stock is worked on somewhat similar principles. Twelve score of half-bred ewes and three score of blackface ewes are kept, the former being crossed with Oxford Down rams and the latter with Border Leicester rams. The lambs are kept until they are hoggs and sold fat in the following March and April when about one year old. Being well bred, they command as a rule a ready market.

Mr Cunningham does not contend that the system which he follows of rearing all his store cattle and sheep is the best one that could be adopted under all circumstances; but on the class of land with which he has to deal he is convinced that, besides giving the farmer a feeling of greater security, it is a better and more profitable plan than buying.

THE SHEEP MAGGOT-FLY.

PRELIMINARY REPORT.

By Professor R. STEWART MACDOUGALL, Consulting Entomologist
to the Society.

ON account of complaints received regarding losses caused by "maggot in sheep," the Directors of the Society resolved to have investigations made in the hope of obtaining information that might be helpful in combating the plague. A circular inviting replies to the following questions was issued to flock-masters in 1902:—

1. Have maggots attacked your sheep in recent years? If so, what percentage of your flock has been attacked? What has been the extent of your losses from maggots?
2. What breed and class of sheep do you keep?
3. Under what circumstances have you found the fly (which produces the maggot) most prevalent—in sheltered, or woody, or exposed places?
4. In what month is the maggot first noticed?
5. At what time of the year is the maggot most plentiful with you?
6. How often during the year do you dip your sheep, and at what dates?
7. Are you of opinion that more flies than one attack the sheep and cause maggot? If so, how do you distinguish the flies from each other?
8. Have you observed a large variety of maggot and a smaller variety of maggot on the sheep? If so, have you noticed how the two varieties differ in the positions they take up on the sheep and in their mode of injuring the sheep?
9. What have you found to be the most useful preventive or remedial measure for maggots? What sheep-dip have you found most effective in checking the maggots?
10. Kindly add any other information you can conveniently give.

In reply sixty-two schedules with answers were received from the following counties: Caithness, Cromarty, Ross, Inverness, Moray, Banff, Aberdeen, Forfar, Perth, Argyle, Bute and Arran, Dumbarton, Fife, Mid-Lothian, Haddington, Berwick, Roxburgh, Dumfries, Kirkcudbright, Ayr, Lanark, Peebles, Selkirk. Thus every district of Scotland, if not every county, is represented, and the result is a body of evidence interesting generally, important scientifically, and useful practically.

Life-history of Maggot-fly.

Before proceeding to annotate and summarise the evidence in the returned schedules I think it may be useful to give some notes on the position of the "maggot-fly" amongst the two-winged insects and on its life-history.

Muscidæ is a family of dipterous insects containing many genera and species. Some members of the family are blood-suckers in the adult condition, others take honey, &c. The larvæ or maggots may play the useful part of scavengers, feeding off decaying matter, or they may be harmful, as in the maggot-fly, by boring into the flesh. Included in the family are the house-fly (*Musca domestica*), the stable-fly (*Stomoxys calcitrans*), the blow-flies or blue-bottles (*Calliphora*), the green-bottles (*Lucilia*), the horn-fly of the United States (*Hæmatobia*), the tsetse-fly (*Glossina morsitans*), and *Glossina palpalis*, which acts as the carrier of the protozoon parasite, the cause of sleeping sickness.

Stomoxys lays its eggs in dung, and its maggots are scavengers tunnelling in the dung; the adult insect or fly, in its quest for blood, attacks man or a domesticated animal, piercing clothing and cutting through skin by a sharp-pointed blade carried in a groove of the proboscis.

The house-fly maggots are also scavengers. The blue-bottles lay their eggs upon flesh and rotting animal matter; amongst recorded cases of dipterous larvæ having been taken from the nose or ears or stomach of human beings the blue-bottle is represented. It will be seen later in this communication that the belief is widespread in Scotland that the blue-bottle is one cause of maggot in sheep. Whether this be really so or no, there is no doubt about the part in this work played by the green-bottles, which belong to the genus *Lucilia*. The blue-bottle or blow-fly genus, *Calliphora*, has its members more gloomy or sombre in appearance as contrasted with the somewhat shining metallic brightness of the so-called green-bottles (these last even in the same species show slight variations in shade and colour). If examined carefully with a good lens, fresh specimens of *Calliphora* will be seen to have a number of hairs covering the space in front of the eyes, whereas these hairs are absent in the case of *Lucilia*.

In the South United States one species of *Lucilia*,—viz., *L. marcellaria*,—known as the screw-worm, is a great pest. While its eggs may be laid on rotting animal matter, the fly, if its numbers be great, lays its eggs on man and stock, in wounds however trifling, and especially if a prurient discharge be present. The maggots bore into the flesh, and may be the cause of death.

With us two closely resembling species, *Lucilia sericata* and *Lucilia cæsar*, lay their eggs on sheep.

L. sericata is the better known. The female, capable of laying as many as 500 eggs, fixes these in clusters of twenty and more to the wool. The tiny eggs may hatch in twenty-four hours, and soon the legless maggots by aid of their mouth-

hooks burrow into the skin and flesh. The maggot is full grown in a fortnight,—with variations according to weather conditions,—when it measures half an inch in length; it drops to the ground, where the pupation stage is passed under cover of the last moulted skin of the maggot. With the life cycle passed through so rapidly there may be several generations during the season.

Signs of Attack by Maggot.

The following are characteristics of attack of maggot on sheep: the matting together of the wool fibres; a continual wagging of the tail; the rubbing and biting and scratching of themselves by the sheep in their efforts to allay the irritation caused by the feeding maggots; much inflammation; the oozing from the sores of an evil-smelling sticky fluid; discoloration of the wool, which falls out and in bad cases does not grow in again; emaciation of the sheep, especially lambs.

Prevalence of "Maggot" in Scotland, and evidence of its increase and spread.

All the returns make mention of the presence of maggot among the sheep, there being very considerable variation in the percentage of attack named—as low as 2 to 3 per cent, a number 5 to 10 per cent, and in one case even 50 per cent of cases.

A distinctly important point brought out by the inquiry relates not only to the widespreadness of maggot and its increasing frequency, but to its spread to high-lying hill pastures, where till recently in many places the attack seems to have been almost unknown. Below I quote representative statements, chosen as much as possible to avoid reduplication of answers from the same counties.

The maggots have been very prevalent in recent years, and the losses, especially among the lambs, have been very heavy; among ewes lighter, but on the increase. What strikes me most is the inroads maggots are making among purely hill sheep. Of course, among this class of stock detection is more difficult and losses are becoming heavier. Till 1893 or 1894 we had no trouble with maggots unless in sheltered, woody, or low ground. About this time the fly began attacking ewes grazing on the hills; they have been getting worse every year, and now I am fully of opinion that sheep grazing at from 1900 to 2300 feet above the sea-level are just as liable to be attacked as sheep grazing in sheltered, woody, or low-ground pasture. Even on low ground the last few years there has been a steady increase year by year. (Mr David Reid, The Crofts, Bal-later.)

On two grazings, one of 40 acres at a height of 1200 feet above the sea-level, and the other of 250 acres at 150 feet above the sea-level, I find the maggots worse on the higher. It is not above ten years since we ever

saw maggots at Braemar, except when we took home lambs from Lanark, and then they might have been "struck" farther south on their way north. (Mr William Gordon, Auchallater, Braemar.)

Possibly 10 per cent are attacked among park-fed sheep, and in the fields the direct losses are slight, as the sheep are seen to twice every day and those struck hand-dressed. On the hill ground 10 per cent may be the proportion attacked by maggots in recent years, and perhaps two-thirds of this number would be lambs; the losses amongst the lambs would average $2\frac{1}{2}$ per cent. When a weaned lamb has been attacked by the fly it is inclined to seek shelter amongst rush-bushes or rank heather or any sort of ravine. We are never troubled on the hill among ewe and wether hogs. (Mr James Brown, Rhynie.)

Maggots had never been troublesome in this district till the season of 1899. (Mr P. J. Sinton, Glen Nevis, Fort William.)

Ten to fifteen years ago maggots were practically unknown in the hills in this district. For the last five or six years they have been a serious drawback, and are now quite common on the highest grazings in this quarter. (Mr Archibald Whyte, Glenmoy, Kirriemuir.)

In this district [Breadalbane] the fly is rapidly extending its area, and many high-lying farms, where up till quite recently maggots were unknown, are now badly infested. (Mr Alex. Campbell, Boreland Farm, Killin.)

Maggots were only known on the lower more sheltered parts of this farm till three years ago, when all of a sudden, as it seemed to us, sheep were attacked on the highest-up hirsels, and considerable damage was done before the shepherds realised the situation. Since then the maggots have continued to attack sheep on all parts of the farm, but as their presence is looked for our direct losses are small. But they entail a great amount of extra work. (Mr John Craig, Innergeldie, Comrie.)

During recent years the maggots have been found at a much higher altitude; on some parts of my farm maggots had not been seen until two years ago. (Mr Peter M'Intyre, Tighnablaair, Comrie.)

When I began sheep-farming in 1850 it was very rare to have sheep on the hills attacked by maggots. I cannot say I have suffered much loss from deaths, but I have been put to very great expense in extra shepherds and watching the lambs after weaning. (Mr Menzies, Finnart.)

Our experience is that maggots are becoming more prevalent higher up every year, and indeed in the summer of 1901 we had cases on the top of Ben Voirlich (3224 feet). (Mr Thomas Walters, Glenample, Perthshire.)

Maggots have increased very much in recent years, and the last four years have been far worse than any previous time. Perhaps 2000 acres of the farm consists of broken land 1600 to 2000 feet above sea-level. Until the last three or four years this was entirely free from attacks of maggots, but now we find it the worst of all to look after. (Mr William Cairns, Glen-Aitney, Perthshire.)

Maggots do not cause much loss on this farm—in fact, till within the last three years we had scarcely any sheep troubled with them. There is no doubt the fly is on the increase in this district. I know farms in the neighbourhood where maggots were comparatively unknown till five years ago which are now pretty bad with them. (Mr R. Macdiarmid, Lochawe.)

Very little attack until the last few years. (Mr W. Smith, Ardtornish, Oban.)

Maggots seem to me to be very much on the increase in recent years. (Mr James Allan, Arran.)

Within the last few years there has undoubtedly been a great increase in the number of sheep affected with maggots on hill land. Up till re-

cently it was rare to see a maggoted sheep on the higher-lying farms from 800 to 2000 feet, now it is quite common. (Mr Wm. A. M^rTurk, Barlae, Dalry.)

We have maggots in the low ground, but also in high exposed mountain land where till the last few years maggots were never known. (Mr James Moffat, Gateside, Dumfries.)

Of late years maggot has been found on sheep on high bare hill land. (Mr T. Welch, Ericstane, Moffat)

There is no doubt that the maggot-fly has increased in recent years, and the maggots are now found in higher altitudes than formerly. (Mr Walter Elliot, Hollybush, Selkirkshire.)

A return from Caithness and one from Ross give hill-pasture attack as almost unknown.

Losses direct and indirect.

Very severe direct loss (*i.e.*, loss by death from maggot infestation) was not often reported, and such loss, as is natural, was chiefly in hill farms. The tortured animal has a tendency to wander away from its fellows and get into places where it is never found, no matter how vigilant the shepherds may be. On low ground, the oversight of the sheep being much easier, deaths were not numerous, and were often described as rare. On all hands the watchfulness of the shepherd and how much he had in his power in the way of prevention and alleviation were insisted on. Thus, as typical, "Our loss from maggots would be very heavy did the shepherds not keep continually on the outlook for any affected sheep, which are at once treated."

In one of the Inverness-shire returns comes a statement of a loss of ewes, twenty per season; and in another return from Perthshire, on hill ground from 800 feet to 1760 feet high, the flockmaster reported that in the month of August 1900, when the shepherds were attending markets, he lost twenty sheep in a few days.

But if the percentage of direct loss from death is low, indirect loss is heavy. This indirect loss may be classified as under:—

- (a) The extra work entailed on the shepherds themselves.
- (b) The necessary employment of extra hands, with the consequent expense. This was referred to in a number of the schedules.
- (c) The disturbance to the stock by the continual hunting of them and collecting them.
- (d) Sheep after being struck thrive badly and fetch less in the market. Attacked sheep are depreciated in value, taking some time to recover, and even then, if attack has been bad, never thriving so well as before.

(e) Disfiguration, lessening the value. "Some lambs could not be sold with their neighbours on account of their skin being broken." (Berwickshire.)

Breed and Class of Sheep.

The breeds and classes of sheep in Scotland are numerous and well known and need not be detailed here, for as the evidence goes no one breed or class of stock succeeds in escaping the attentions of the fly. Two records, one from Argyleshire and one from Dumfriesshire, state attack on Blackfaced sheep to be much worse than on Cheviots, but these are the only ones. "We had no maggot of consequence amongst the Cheviots, although they were common on the Blackfaces, a narrow loch dividing two hirsels, and a wire fence dividing other two." (Argyleshire.) "The fly attacks Blackfaced sheep to a much greater extent than Cheviots." (Dumfries.)

Writing of Blackfaced ewes and wethers, Mr Andrew Hutchison, Spittal of Glenshee, says, "I had no wethers attacked in 1901, only ewes and lambs, but the wethers were at 1800 feet above sea-level and the ewes about 1200 feet."

While no class of stock succeeded in escaping the fly, lambs were repeatedly mentioned as suffering most.

Month when attack is first noticed, and the times of the year when the Maggots are most plentiful.

The answer to questions 4 and 5 of the schedule, considering the range from north to south, evidenced that on the average the fly was first noticed at work from the middle and end of May till the middle of June. Mr Peter M'Intyre (Tighnablaair, Perth) mentions a case on a farm adjoining his own where maggots were once found on the sheep by April 15. Mr Matthew S. M'Kerrow (Lanarkshire) found the sheep once struck on the 24th of April, and Mr James Allan (Bute) also notes an April attack. In two returns from Caithness one gives July, the other "July, exceptionally June." In all other counties the maggot had been found at work by June at the latest.

Infestation in the case of every county reported on might be said to be at its very worst in the month of August. From no single county was August omitted as a very bad month. Still more than half of the counties gave the period of worst attack as "from the middle or end of July to the beginning of September," the others giving "August and to the second week of September." September 25, 1901, was given as a date from Perthshire when the maggots were once found at work;

another gave the beginning of October, and an exceptional case was reported from Kirkcudbrightshire as late as November 6.

Regarding the foregoing evidence I would make two remarks:—

1st. The periods of onset of the fly and of the disease being at its height are worth noting carefully, as they suggest not only the times when special vigilance is necessary, but they have a very suggestive relation to dipping periods.

Dipping for Maggot.

In the filled-up returns the question as to the dates at which dipping was practised has been answered generally, and often without special reference to maggot. While October, August, and July were the commonest months for dipping, followed by November, and then by February, March, and June, the only month in the whole year where no single case of dipping was mentioned was the month of May, the omission of which is not difficult to understand. The times for dipping varied with the purpose—old sheep, ewes, weaned lambs, stored lambs, ewe hogs after wintering, &c. Still, apart from common practice, a number of flockmasters were forced to dip for maggot alone. Thus one return read: "I have been forced to dip the hill sheep twice in the season for several years back. Park sheep scoured with soap-and-water at the end of June were generally dipped again in July and the beginning of August." Testimony is borne to the advantage of dipping, but the evidence is practically unanimous as to the immunity that dipping gives not persisting for very long. I will return to this point later, meanwhile here only adding that where dipping is practised for maggot, the times chosen should have a reference to the periods of onset and greatest damage of the fly.

2nd. No absolute date can be given for fly appearance or disappearance. Several factors play a part—*e.g.*, temperature, altitude, weather conditions, &c.

Temperature and Insect Life.

There is a pretty general opinion that a severe winter, with continuous cold and frost, is very injurious to insect life. But this is not necessarily so. On the approach of winter, insects in their stages as larvæ, pupæ, or adults make preparation for their winter hibernation in, very likely, some sheltered position. Certain caterpillars in such condition may be frozen and yet not lose their life. I have kept mature beetles for a time in winter under a bell-jar in a cold room, and though they had been lying

on their sides motionless for days, to all appearance dead, yet on my removing the bell-jar and taking the beetles up in my hand and warming them, they soon showed by their activity that they were not dead but had only been in a state of hibernation. I have kept the same beetles an inch or so below the surface of the soil from November till March, and after lying still all that time, when the warm days of spring returned the beetles resumed their active life, feeding and pairing. Similarly I have taken the adult turnip-fly or beetle, in the winter, from one of its winter quarters under the bark scales of a pine-tree, and also the ladybird from such shelter places as the under sides of tree-labels and the top of the window inside a house.

The dangerous conditions for insect life are continued and rapid variations in the temperature, with, it may be, heavy rains. If a seemingly early spring comes on, many insects may be tempted out of their hiding-places, and the more, the longer the sunshine and warmth continue; and then if a severe spring frost come suddenly it may easily prove fatal in its effect on insect life.

I may take the case of the wasp in illustration, as the wasp was incidentally mentioned in one of the answered questions. On the coming of winter all the members—drones and workers—of the wasp community die, except the queens. The queens hibernate in some looked-for and chosen place of shelter. On the queen devolves the responsibility in the next spring of beginning the new nest, of making the first cells and collecting food-material amidst which she will lay the eggs from which, after development through larval and pupal stages, the workers to assist the queen will be produced. Now, if the winter be prolonged the queens remain in safety in their places of retreat, to come out only when the weather becomes warm again. Should the warm weather or spring continue settled, then these queens are able to act as foundresses of the new colony with a minimum mortality, and, other things being equal, the year may be reckoned on as what would be called a bad wasp year—I mean, bad for the wasps' enemies. On the other hand, should there be alternations of warm weather early in the year with severe weather, then many of the queens, tempted out of their winter quarters by the early sunshine, will perish from the following cold, with the consequent failure of the new nest.

It should be remembered, then, that in the case of the sheep maggot-fly, temperature and weather conditions generally play their part in modifying the times at which the sheep may be first struck, the period of greatest damage, and the close of the attack.

Favourable weather conditions may also accelerate development in the different stages as egg, larva, or pupa, cause an

increase of broods, and therefore an increase of individuals; or an increased number of individuals apart from increase of broods, as the shorter the time for development the less exposed the larvæ and pupæ to enemies and the greater chance for adult life.

Are there more kinds of Sheep-Fly than one, and can the presence or mode of work of different Maggots be distinguished?

I have been familiar for some time with the belief that more than one species of fly (excluding *Lucilia caesar*) was supposed to act as an agent in causing maggot. I tried more than a year ago to obtain material in order to settle if possible this question, but did not succeed in obtaining it. I also arranged for observations and experiments to be done by one of my pupils, but ere these had started he was called abroad.

In the returns from the different parts of Scotland on the above points there is a certain amount of contradictory evidence. A few declare for only one fly, which they distinguish as green in colour; a few are as certain that there is only one fly, and that it is the blue-bottle. Very many agree that there are two kinds of fly, but there is some disagreement regarding details; e.g., one observer states that two flies lay on the sheep,—one, the green-bottle, which he has caught in the wool, and another, “a small dull-black fly that looks quite like a house-fly, except that it is very dull in colour.” One other observer speaks of a black fly.

The great majority, however, who declare for two flies, distinguish them as the blue-bottle and the green-bottle. No fewer than forty returns witness to there being these two kinds of fly and two kinds of maggot—the counties represented in this opinion being Aberdeen, Argyle, Ayr, Berwick, Bute, Dumbarton, Dumfries, Fife, Forfar, Haddington, Kirkcudbright, Lanark, Mid-Lothian, Perth, Ross, Roxburgh.

Here are some of the statements:—

There are two flies, a large one and a small one, and two maggots, a larger and a smaller. The large maggot moves over the body of the sheep before piercing; the small one cuts directly into the spot where the fly strikes. The large one is quite white; the smaller, which has a dark head, is the worst. (Largs, Ayrshire.)

Of the two maggots the smaller is much more fatal, and digs deeper into the animal. (Bute.)

There are two kinds of maggot. The smaller ones burrow into the flesh of the sheep, the larger ones are more surface feeders. (Dumbarton.)

There are two flies—the blue one earlier, and later the more harmful green. There are certainly two kinds of maggots—the larger much more easily got out, and it does not cut the sheep unless in great numbers; the small ones dig in at once, and are very hard to remove. (Dumfries.)

The big maggots don't cut in much, but work more along the back.

The small ones are much more lively, and cut inwards far oftener. (Forfar.)

There are two kinds of fly—the larger and darker appearing first, and the green later. There are two maggots—the smaller far more active, inclining to burrow into the skin at once. (Kirkcudbright.)

There are two flies, the blue-bottle earlier and the green-bottle later, not earlier than August. I think the blue-bottle will only strike where the sheep is dirty and has a smell; but the green will strike on the back and everywhere, even though the sheep is quite dry. Of the two maggots, the large one, not nearly so troublesome or dangerous, spreads quickly over the sheep in any direction, and seldom does worse than graze the skin, whereas the smaller ones eat their way right into the body and kill the sheep. (Lanark.)

There are two varieties of maggot as distinct as the flies. The larger one, which we ascribe to the larger fly, is almost invariably found on sheep that are dirty, and appears to come to maturity in many cases without cutting through the skin to any extent. The smaller, and infinitely the worst, is got on every part of the sheep, often without appearance of anything to attract them to that particular part. They cut deep through the skin in a very short time. (Perth.)

The blue-bottle comes in June and July and the green in August. The larger maggot is white, and the smaller has a black spot, and is by far the worst. (Mid-Lothian.)

In a great many cases where the writers mention the two flies, the blue-bottle is stated to be the earlier and the attack of the green-bottle later. There is considerable agreement, too, about the smaller green-bottle showing a willingness to strike anywhere, and not alone at special places attractive because of odour. The larger maggots, it is also agreed, are easier to treat and kill.

I will be grateful if those who have answered the queries, or any interested, will send to me, in the course of the summer or autumn, material from the sheep, either of caught flies or of eggs (allowed to remain attached to the wool) or maggots in any stage of development. The material should be carefully packed in a small tin box (an old mustard-tin that had been cleaned out would do). With such material I would, by comparison of larvæ and breeding out of the flies, do what I could to gain sure information.

Conditions favourable for the Flies; likely habitats and probable causes of increase and spread.

Weather.—The character of the weather, as already indicated, has an important influence on the presence and activity of the flies. The following, repeated more or less often in the evidence, may be taken as typical statements:—

In showery weather with sunshine the maggot is more plentiful than in dry weather.

Double the cases in close moist weather that occur in dry weather.

The fly strikes mostly in showery and thundery weather. After a hot May or June there is always a bad plague of maggots.

The chief factor in regulating the extent of the attack is the weather. Damp, warm, close weather favours.

Under a hot burning sun after a thunder-shower.

After a spell of hot weather, when a shower of rain comes and wets the wool, the yolk being strong attracts the fly.

Sheltered and woody places.—There is very much agreement that sheltered woody places are much affected by the fly. About thirty of the replies use the term “sheltered woody places”; in other replies there are such modifications as—

A field near any sort of hedge, generally worse than in the open.

Most prevalent on farms with hedges.

Woods and shelter-places during May and June, all over the farm, hill and dale, in July and August. (Inverness.)

In sheltered places except in very warm weather, when the fly is quite as bad on exposed hillsides. (Kirkcudbright.)

Sheltered places such as banks alongside streams. (Mid-Lothian.)

Sheltered places, whether the shelter be woods or hillocks. (Ayrshire.)

Near plantations, and on grassy land, especially in the neighbourhood of rocks. (Ayrshire.)

In sandy hollows. (Fife.)

Worst on sandy land where there are sheep-scrapes, [and] sheltered and dry sandy places near water. (Forfar.)

More flies are seen in dykes with turf coping than anywhere else. (Argyleshire.)

Mr Campbell, Boreland Farm, Killin, writes:—

During the maggot season the sheep do not come lower than 800 feet above sea-level. There are no woods, but a considerable portion of the lower ground is badly overgrown with ferns. The hill, which ascends to over 3000 feet, is almost entirely green, and the higher ground is as badly affected as the low and sheltered parts.

As opposed to the above is this communication from Argyleshire:—

The maggots do not cause much loss on this farm. Till the last three years scarcely a sheep was touched. There is a lot of wood and bracken on this farm—in fact, a stranger looking at it would at once say it would be very bad for maggots, but such is not the case.

Brackens.—A number of the answers give brackens as favouring the fly, and where rank, as making struck sheep difficult to find. Thus:—

Wherever there is cover, such as bracken, rocks, or plantations, the flies seem to congregate most, as they shelter in such places at night. (Mr R. Sinclair Scott, Largs.)

The very large increase of brackens on many hills is the cause of a larger death-rate from maggots than formerly. Sheep struck get in among the brackens and are not seen by the shepherd. On some of the Loch Lomond hills brackens are 6 feet high. (Mr James Lumsden of Arden.)

I think since bracken and thistle got so bad on hill ground maggots have been sadly on the increase (Mr James Elliot, Hindhope.)

My farm is entirely free from plantation, and the lowest elevation of my hill pasture is fully 900 feet above the sea-level, reaching to about 1500 feet. The fly is most prevalent in the lowest parts, especially amongst brackens. It is very rare in the highest parts. (Mr John Craig, High Ploughland.)

On exposed ground chiefly, but portions of it bad with brackens. (Argyleshire.)

Long heather is sometimes named as favouring the fly, but others who mention it do not complain of it. Rank grass, such as cocksfoot, is noted in one answer from Forfarshire as affording cover for the flies.

Dirty sheep.—There is absolute unanimity as to the flies being attracted to dirty sheep. Dirty sheep practically invite attack.

Unburied carcasses.—There is no doubt whatever that carelessness in leaving unburied dead sheep or lambs is a most fruitful way of increasing the flies. These carcasses are used as breeding-places, whence the flies will sally out when mature to attack the sheep.

One flock-master writes :—

There is a very bad practice which is common with shepherds—viz., burying fallen sheep by taking them to an old dyke or cairn and covering them with stones. The carcasses become perfect nurseries for maggot-flies, and in one of these places I have seen thousands of shells [empty pupa-cases] from which the flies had emerged.

Another writer urges that “gamekeepers should be prevented from hanging legs of dead horses in plantations for the purpose of feeding pheasants upon the maggots.”

Dead birds: e.g., *grouse*.—These lying free will act also as breeding-places.

Rabbits.—Quite frequently one meets in the answers the statement that maggot is worst where rabbits are numerous: e.g.—

The trouble is worst around woods and amongst brackens, particularly if rabbits are numerous. It is common enough to bolt many blue-flies when ferreting rabbits, though they may be there temporarily, attracted by carrion. (Perthshire)

Hares are just as bad, but they inhabit the higher ground, which is more exposed. (Perth.)

Rabbit-burrows are very bad in my opinion. (Forfar.)

Among brackens, especially if there be any rabbit-burrows.

Starlings.—The starling has increased greatly in numbers in many parts of the country, and from three different sources comes the statement that the increased numbers of the starling has made for an increase in the number of maggot-flies. This is an interesting but serious charge, as the starling has often been praised for playing the part of sanitary inspector when

perched upon the backs of the sheep, and relieving the sheep of their tics.

I consider the cause of the maggot being very much commoner to be the great increase in starlings in this district. The starling leaves filth on the sheep and the fly strikes, and with the aid of a heavy dew or a little rain the maggots are able to reach the skin. (Mr James Hamilton, Woolfords.)

Even when sheep have been kept clean the cause of their being struck has been found to arise through filth dropped on the sheep by the starlings, which often appear in great numbers on the pastures. (Mr George Glendinning, Hatton Mains.)

Mr John Ross, Fearn, also blames the starlings.

One is unwilling to say anything unkind about the starling, because this bird, being to such a great extent insectivorous in diet, is really in many ways the most helpful bird to the farmer and forester.

Disturbing the Balance of Nature.

The observation that the great increase in the numbers of starlings may have a connection with the increase of maggots is just one proof the more of what is so constantly being borne in on the mind of the biologist, how delicately poised a thing is the "balance of nature," and how a little interference, say by the introduction of a new plant or a new animal, or an increase of either above the normal, may set in motion a chain of circumstances that beforehand would have been little suspected. Many examples crowd into one's memory for quotation. Let me mention a comparatively recent one, in the south of England, of how one man's love of birds interfered with the prosperity of a neighbouring farmer. The farmer cultivated for the market quantities of watercress. A neighbouring proprietor interested in birds started a heronry. The herons, flying to the neighbouring stream, fed off the trout; the trout being destroyed, the caddis-grubs, which had been previously kept in check by the trout, were now unmolested, and fed in such numbers on the watercress as to spoil the crop.

Preventive Measures.

1. *Cleanliness.*—"Keep the sheep clean," ran like a refrain through the schedules. Sheep should be kept thoroughly clean about their hind-quarters. A good preventive is to clip the wool of the tail and between the hind-legs, docking the tails of sheep when too long. The purpose is to clear away any filth and to leave as little chance as possible for lodgment, for the flies have a keen sense of smell and are attracted to dirty places

for their egg-laying. Hence it is that sheep suffering from diarrhoea fall such easy prey to the fly.

The most useful preventive is the free use of the sheep-shears in removing any dung from the fleece or any dried blood or discharges which may remain attached to the wool after lambing. Clipping the tails of the hogs and ewes in spring or the beginning of summer, and cutting all wool which may get wet with the urine or soiled with the faeces, help very much in preventing the attacks of the fly. (J. & J. M'Diarmid, Morinish.)

Some hold that an absolutely clean sheep will not be struck; but while not many would subscribe to this literally, it can scarcely be denied that clean sheep are more likely to escape the attentions of the fly. Much depends on the prevalence of the fly.

In a bad season, when the plague gets epidemic, the blow is deposited anywhere on the body of the sheep (and not only at the anal region), and on parts where there is not a speck of dirt. (Killin.)

2. *Dips and Dipping*.—While it is agreed that dipping is most useful and will keep off the fly for a time, there is almost unanimous testimony that this immunity does not last for long, and that dips must be repeated. Thus "the July dip of all sheep I consider of the utmost value in keeping fly off. In closely sheltered situations another dip a month later amply repays the small cost and labour."

As was, perhaps, to be expected, over the wide area a number of different kinds of dip are used, and in the course of the evidence one could see that often there was a tendency for certain dips to be "local." Almost every one of the well-known dips are spoken favourably of as effective for a short time at least.

Regarding the length of time for which dipping may give immunity from striking, I may quote the following:—

I have tried many sheep-dips on lambs, and my experience is that about ten days after dipping they are as liable to be attacked again.

No dip I have used has prevented striking for a longer time than a fortnight to three weeks.

No dips we have tried will keep the sheep clean for longer than a fortnight, especially lambs on foggage.

I have seen the same sheep attacked three times in the same season, after being each time thoroughly cleaned and dipped.

All dips seem effective for a week or so, or so long as the strong smell remains; but after heavy rains the fly attacks very soon after dipping.

One observer, with an impatience born of much worry with the fly, writes:—

If dip manufacturers would put the cost of their advertisements and their agents' commission into their dips, they would be more efficacious.

Sulphur, and dips that contain sulphur as one of the ingredients, seem most in favour by way of preventive:—

A dip with sulphur as its principal ingredient, but dry sulphur as good as any.

I find a dip composed of sulphur, arsenic, soda, and soft-soap is most useful for keeping off the flies, and it is seldom the sheep were attacked after being bathed in this dip.

The best dip is a sulphur one, mixed with a greasy one to make it stick longer.

If sheep be kept well dressed with sulphur they will not be struck.

Do not wash the sheep to clean them with plain water, as the fly strikes before they get dry, unless sulphur is sprinkled on.

The most useful preventive I have tried is a dip made of arsenic and sulphur. It suits well in dry weather, but I have not found any dip used a preventive in warm moist weather. The more showery the weather the less effective the dips.

It is almost impossible to keep rams free in damp weather, unless you constantly open their wool and dust them full of sulphur.

To prevent maggots breeding behind the horns of rams, olive-oil and pitch-oil should be poured there, and the oil dusted with sulphur.

One writer strongly urges the establishment of chambers and apparatus for fumigation.

It should be carefully borne in mind that any dips containing arsenic must not be applied to broken skin. There is also the consideration that it is said certain dips somewhat spoil the wool for showing purposes.

There is a distinct feeling in the evidence against the use of carbolic dip.

Carbolic and its preparations will certainly kill maggots, but as a preventive it is of no use.

Carbolic acid dips seem useless to prevent the fly striking.

Remedial Measures.

1. Evidence is uniformly in favour of Cuff's fly-oil. It does not injure where there is a broken skin. The drawback is the expense. In addition to killing the maggots it serves to keep the fly from settling on the place to which it has been applied for a day or two; and if, after dressing, the part be dusted with sulphur the protection is greater. The oil must not be used too strong, as if the maggots be killed at once they are difficult to remove from the wool, and sheep so treated will be struck again.

2. Naphtha used sparingly on the spot attacked is mentioned as killing instantly without discolouring the wool.

3. One farmer writes in favour of equal quantities of paraffin-oil and buttermilk mixed well and applied to the affected parts.

There is room for practical experiment along these two lines:—

1. The obtaining of a dressing which will act as a deterrent to the fly against its egg-laying—at least for a longer period than any dressings or dips in the market at present.

2. The obtaining of some preparation as effective, say, as Cuff's, for killing and removing the maggots from struck sheep, but cheaper.

REVIEW OF AGRICULTURAL EXPERIMENTS.

By Dr A. P. AITKEN, Chemist to the Society.

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE.

THE experiments described in the second Annual Report of this flourishing school make a bulky volume, and give evidence of great and well-directed activity.

The first record is that of Professor Paterson, describing two feeding experiments—one with cattle, conducted at Biel Home Farm, East Lothian, and the other with sheep at Newlands, Dumfriesshire.

The former was a modification of an experiment that was carried out the previous year. The object was to compare the relative feeding values of linseed-cake and decorticated cotton-cake when given along with a full ration of swedes, and also when maize-meal was substituted for one-third of the swedes. The cattle used for the purpose were 40 Irish cattle, rising two-year-old, divided into four lots of 10 each, and housed in cattle-courts. They were allowed an equal mixture of chaff, cut hay, and straw *ad libitum*, and the feeding lasted 14 weeks.

A summary of the results from a feeder's point of view is given in Tables I. and II.

TABLE I.—TOTAL FOODS CONSUMED BY EACH LOT.

	Lot I.	Lot II	Lot III.	Lot IV.
	lb	lb.	lb	lb.
Swedes	88,200	88,200	54,880	54,880
Hay and straw . . .	6,023	6,247	7,413	6,921
Linseed-cake	5,950	...	5,950	...
Decorticated cotton-cake .	...	5,950	...	5,950
Maize-meal. . . .	...	...	5,570	3,570

TABLE II—TOTAL LIVE-WEIGHT INCREASE AND STRAW CONSUMPTION.

	HEAVY ROOT FEEDING.			LIGHT ROOT FEEDING.		
	Linseed-cake		Decorticated cotton cake	Linseed-cake		Decorticated cotton cake
	Lot I		Lot II	Lot III		Lot IV.
	cwt.	qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.	cwt. qr. lb.
Live-weight, 12th Jan. .	81	1 12	81 1 4	81 1 6	81 1 5	81 1 5
Do. 20th April .	98	3 15	101 0 25	102 2 2	98 2 10	98 2 10
Increase in 14 weeks .	17	2 3	19 3 21	21 0 24	17 1 5	17 1 5
Hay and straw consumed .	53	3 3	55 3 3	66 0 21	61 3 5	61 3 5

Decorticated cotton-cake has done better than linseed-cake when a full feed of turnips was given, but the linseed-cake did best when one-third of the watery swedes were replaced by the dry maize-meal. The author attaches a good deal of importance to the amounts of straw, hay, and chaff consumed, and considers that the greater quantities of that constituent eaten by Lots II. and III. was an indication that these fodders were "dietetically best suited" to the animals, or, as otherwise expressed, "an indication that the other foods of the ration were physiologically best suited to the animal organism." The analysis of the different substances forming the dietary is given, and their relative digestibility is guessed at, and a good deal of labour and ingenuity is displayed in discussing the results from a theoretical standpoint; but an examination of the progress made by the individual animals, as detailed in the tables given in the appendix of the Report, shows such enormous differences as to make it evident that no definite conclusions regarding the objects for which the experiment was instituted can be drawn with any certainty.

In Lot I. (Table III.), Nos. 8, 9, and 10 have made more than double the average increase of the others. Lot II. is a fairly even lot, but No. 9 was a failure. Lot III. contains some good feeders, No. 4 being exceptionally good; and Lot IV. consists of one-half good feeders and the other half bad, and No. 8 a failure, the worst of all the 40. With such discrepancies as these no definite conclusions can be drawn. It only needs No. 4 of Lot III. to change places with No. 9 of Lot IV. to make the worst lot the best and the best lot about the worst. It is plain that individual peculiarities and feeding tendencies have dominated the results and completely masked the objects aimed at in the experiment.

TABLE III.—INDIVIDUAL INCREASE DURING 98 DAYS

No	Lot I			Lot II			Lot III			Lot IV		
	cwt	qr.	lb	cwt	qr	lb	cwt	qr	lb	cwt	qr	lb.
1	1	3	7	1	3	19	1	3	17	1	3	4
2	1	0	14	2	3	3	1	1	26	1	0	23
3	1	2	6	2	0	7	1	1	17	1	3	2
4	1	3	5	2	0	15	3	0	10	2	1	19
5	1	0	22	2	0	22	2	0	11	2	1	10
6	1	0	11	2	0	21	1	3	12	1	1	10
7	1	1	5	1	1	8	2	2	15	2	0	17
8	2	2	22	2	1	7	2	1	3	1	1	16
9	2	1	16	0	2	27	2	2	15	0	2	8
10	2	2	7	2	1	4	1	3	10	2	1	8
Total	17	2	3	19	3	21	21	0	24	17	1	5

Cattle-courts are not well suited for feeding experiments where fine distinctions, such as the superiority of one cake over another, are attempted to be drawn. There is usually one miserable animal in a court that is subject to persecution, and that may have been the fate of No. 9, Lots II. and IV. Such experiments would require that each animal occupied a single stall, for even when there are two in a stall one is sure to be "king," and to impair the progress of his fellow. Moreover a somewhat prolonged preliminary period of feeding with half as many more animals than are eventually selected would be needed in order to secure an even lot out of cattle brought in in a promiscuous manner. With all the care and trouble bestowed on this experiment it is evident that it was founded on too narrow a basis to produce any definite practical results or to form the foundation of any useful theories.

Sheep-feeding at Newlands.

The sheep experiment at Newlands was designed to determine the relative merits of various food mixtures, but in addition it had for its object to determine how far it was economical to feed sheep under cover. The experiment was therefore carried out entirely in duplicate—viz., 4 pens of 12 sheep each folded in the open field, and 4 pens comfortably housed. The sheep employed were blackfaced wedder hoggets, and both the outside and inside lots were fed exactly alike both as to quantity and kind of fodders, and the total amounts of these consumed by both lots were as in Table IV. The foods were all eaten up, so that there was nothing to weigh

TABLE IV.

	Lot I.	Lot II.	Lot III.	Lot IV.
	lb.	lb.	lb.	lb.
Turnips	9156	9156	9156	...
Hay	238	238	238	672
Linseed-cake	324	648	...	414
Decorticated cotton-cake	...	...	324	414
Oats	324	...	...	414
Maize . . . . .	...	...	324	414

back. That being so, the sheep must have been somewhat underfed even when under cover, but this must have been especially the case with the lots exposed to the cold climatic conditions outside.

As was inevitable, the housed sheep made most progress, and the way in which the different lots increased is shown in Table V.

TABLE V.

	Lot I.	Lot II.	Lot III.	Lot IV.
	lb.	lb.	lb.	lb.
Increase in outside lots	136	129½	173½	181½
" inside lots	185½	193½	225	191½
Total increase	321½	323	398½	373
Difference in favour of inside lots	50	64	52	10

Had the sheep been permitted to satisfy their remaining appetite with long fodder the results would have been very different, and it is highly probable that the outside feeders would have made relatively much greater progress. It would then have been possible to draw some conclusion regarding the relative profit of the two systems of feeding. The aim of a feeder is to get his fattening stock to consume as much farm-grown fodder as they can, for therein lies the profit.

The experiment as conducted shows the well-known effects of cold, and perhaps of giving stock frozen turnips to eat. This would certainly be the case during the last three weeks, when the temperature was below the freezing-point.

An evident source of uncertainty in comparing the weights of sheep fed outside with those fed inside is the dampness of the wool of the latter, and perhaps the apparent gain of the outside lot in the first weighing was largely due to the wetness of their wool.

The only really reliable test in such an experiment is the determination of the dead-weights, but that does not seem to have been done.

The progress which has been made in the practice of feeding in this country, and the perfection to which the art has been brought, are mainly the result of close observation and shrewd experiment on the part of feeders who lay no claim to be considered scientific, and who have received comparatively little aid from the published works of those engaged in carrying out feeding experiments based on scientific principles. Much of what has been done of the latter kind has been rendered useless for the want of practical knowledge and experience on the part of the experimenter; for it may safely be said that in no department of agricultural research is there more need of careful observation, practical skill, extended experience, and sound common-sense than in the planning and conducting of experiments on the feeding of animals with a view to discover reliable information of a scientific kind. It is therefore to be expected that much of the early work of those who are attracted to this very interesting department of research is chiefly valuable in showing the difficulties that have to be encountered and the errors that have to be avoided before a distinct and sure step can be made in the path of progress.

The failure of the carefully carried out experiments which form the subject of this notice, and of others referred to in the review contained in the previous volume of the 'Transactions,' will have served a good purpose if they impress upon the numerous band of experimenters now busy in educational centres how great the need is of studying carefully the failures of the past before embarking in costly and difficult, though apparently simple, feeding experiments.

An experiment by Professor Wright on the manuring of turnips without dung enables him to conclude that

1. It is advantageous to apply nitrate of soda partly in the drills and partly as a top-dressing after thinning. The advantage is certainly not great,—an increase of about half a ton of bulbs per acre on a 23-ton crop,—and it would disappear if the supply of labour was deficient.
2. When applied wholly in the drills, sulphate of ammonia gives a better yield than nitrate of soda.
3. When no dung is used, some potash manure, such as sulphate, is advantageous, if not essential.
4. As regards phosphates, superphosphate in most years gives the larger yield, but basic slag in equivalent quantity is about as good, especially if the season is wet and mild. A mixture of both has been found to produce even larger crops.
5. About 6 cwt. per acre of superphosphate (30 per cent

soluble), or its equivalent in basic slag, is the maximum that was found profitable; but in unfavourable seasons, or on land in high condition, a third less is sufficient.

These conclusions are drawn from two years' experience on thirteen farms widely distributed.

Further experiments in 1900 on the manuring of potatoes confirm in the main the conclusions arrived at from the widely extended series of experiments of the former years, of which a report was given in the preceding volume of the 'Transactions,' p. 100. More than usual attention was paid to the application of potash manures when applied in spring. It was found that sulphate of potash was better than muriate and much better than kainit, but that the quantity of potash manure when so applied should not exceed 84 lb. of potash per acre, inasmuch as a heavier dressing where dung was used did more harm than good.

Experience derived from many experiments elsewhere has shown that potash manures are best applied in autumn, and it would probably be found that if applied at that time there would be little to choose between the different forms of potash manures, and that the market price would be the chief deciding factor.

Readers of the annual report will turn with special interest to the exhaustive report of experiments on the comparative merits of varieties of oats by Professors Wright, McAlpine, and Paterson. These experiments were carried out in 1900 on sixteen farms in the centre and south-west of Scotland.

There were ten varieties of oats under examination. These the authors divide into three groups—viz.:

Group 1. "The grain-producers," including *Tartar King*, *Waverley*, *Newmarket*, and *Banner*. In these the grain constituted 38 to 43 per cent of the total produce.

Group 2. "The combined grain-and-straw producers," including *Potato*, *Hamilton*, and *Longhoughton*, in which the grain amounted to about 34 per cent of the total producers.

Group 3. "The straw-producers," including *Sandy*, *Tam Finlay*, and *Golden Giant*, in which the proportion of grain ranged from 29 to 32 per cent.

Tables VI., VII., and VIII. show the average produce of eight varieties on sixteen farms and of five varieties on ten farms.

Banner and Golden Giant are omitted from the first table of comparative results, because the seed was late of coming to hand, and they were sown at a later date than the others. For interesting particulars regarding the quantities of seed sown, dura-

tion of growth, and other details, reference must be made to the original report, which occupies upwards of 100 pages, and is profusely illustrated with excellent charts, which show at a glance what would require very lengthened descriptions regarding the comparative merits of the different varieties.

TABLE VI., SHOWING THE AVERAGE PRODUCE OF DRESSED GRAIN, LIGHT GRAIN, AND STRAW AND CHAFF OF EIGHT VARIETIES OF OATS ON SIXTEEN FARMS.

(Arranged in order of Yield of Dressed Grain.)

No. of plot	Variety of oat.	Weight of dressed grain per acre.	Weight of dressed grain calculated into centals (100 lb.)	Weight of light grain per acre.	Weight of straw and chaff per acre.			Total weight of crop per acre.		
		lb.	centals.	lb.	tons	cwt.	qr.	tons	cwt.	qr.
10	Tartar King (plus 33½ per cent seed)	2141	21½	186	1	11	1	2	12	0
11	Waverley . . .	2140	21½	398	1	14	3	2	17	2
9	Tartar King ¹ . .	2136	21½	268	1	11	3	2	13	1
12	Newmarket (plus 33½ per cent seed)	2101	21	299	1	11	1	2	12	3
1	Potato . . .	2039	20½	203	1	19	0	2	19	0
3	Hamilton . . .	2016	20½	259	1	18	3	2	19	0
4	Longhoughton . .	1976	19½	269	1	18	2	2	18	2
2	Sandy . . .	1871	18½	403	2	4	2	3	4	3
7	Tam Finlay ¹ . . .	1863	18½	321	2	6	2	3	6	0
8	Tam Finlay (less 33½ per cent seed)	1721	17½	400	2	6	0	3	5	0

¹ Normal seeding.

TABLE VII., SHOWING THE EIGHT VARIETIES OF OATS, ARRANGED IN THE ORDER OF THEIR AVERAGE YIELD OF STRAW AND CHAFF.

Variety of oat.	Weight of straw and chaff.		
	tons	cwt.	qr.
Tam Finlay (normal seeding)	2	6	2
Tam Finlay (less 33½ per cent seed)	2	6	0
Sandy	2	4	2
Potato	1	19	0
Hamilton	1	18	3
Longhoughton	1	18	2
Waverley	1	14	3
Tartar King (normal seeding)	1	11	3
Tartar King (plus 33½ per cent seed)	1	11	1
Newmarket	1	11	1

TABLE VIII., SHOWING THE AVERAGE PRODUCE OF DRESSED GRAIN, LIGHT GRAIN, AND STRAW AND CHAFF OF FIVE VARIETIES OF OATS ON TEN FARMS.

(Arranged in order of Yield of Dressed Grain.)

No. of plot.	Variety of oat	Weight of dressed grain per acre.	Weight of dressed grain calculated into centals (100 lb.)	Weight of light grain per acre.				Weight of straw and chaff per acre.			Total weight of crop per acre.		
		lb.	centals.	lb.	tons	cwt.	qr.	tons	cwt.	qr.	tons	cwt.	qr.
6	Banner . . .	2275	22 $\frac{3}{4}$	260	1	16	2	2	19	1			
9	Tartar King . .	2198	22	296	1	10	1	2	12	2			
1	Potato . . .	2035	20 $\frac{1}{2}$	220	2	0	0	3	0	1			
2	Sandy . . .	1893	19	439	2	7	2	3	8	1			
5	Golden Giant .	1803	18	307	2	0	0	2	18	3			

From the whole results of these very complete experiments Professor Wright draws the following conclusions:—

1. The most productive in grain were the Banner, Waverley, Tartar King, and Newmarket.
2. The most productive in straw were the Sandy and the Tam Finlay.
3. The Potato, Hamilton, and Longhoughton occupied an intermediate position, being inferior to the varieties named in No. 1 in grain, but superior to them in straw production; and superior to the varieties named in No. 2 in grain, but inferior to them in straw production.
4. On rich soils the varieties that are most productive in grain give the most profitable crops, but on poor soils the most profitable crops are more likely to be produced by the varieties that are most productive in straw.
5. Among the varieties that are most productive in grain, the most highly productive and the most generally valuable are the Banner and the Waverley.
6. Of these two varieties the Banner is the more generally reliable. It is more productive in straw than any of the other grain-producing varieties, and does better than any of them on the poorer soils. Its straw stands better than that of any other variety, except the Tartar King. It ripens early, and is very productive in grain and in meal. It is adapted to a wide range of soils, and is very suitable for general cultivation.
7. On good soils the Waverley oat is also highly productive in grain, and it yields a rather small quantity of a capital fodder. It excels in its yield of meal, the percentage of husk in the grain being lower than in any other oat, except the Newmarket. The meal is, however, of inferior nutritive value as compared with that of the Potato oat, being comparatively poor in oil and in albuminoids. Its ripening is irregular, and on poor or cold soils it is apt to be late in coming to maturity. The straw is tender and easily laid, and on very rich soils the crop is liable to suffer serious injury from this cause. - It is specially adapted for cultivation on good early soils in sheltered districts, and in such conditions it will frequently prove to be the most profitable oat in cultivation.
8. The Newmarket is also a very productive oat in grain, but its straw

makes rather poor fodder. It is best adapted for the same class of soils as the Waverley, and is not at all suited to poor soils. It excels all the other oats in its yield of meal from a given weight of grain, the percentage of husk in the grain being very low. Its straw is very easily beaten down by storms, and on this account it is not well suited for general cultivation.

9. The Tartar King oat excels all other varieties in its earliness of ripening and in its standing power, and it is therefore better adapted for cultivation on rich soils in late and exposed districts than any other oat. It is highly productive on the very richest soils, where other varieties of oats fall down through their own luxuriance. It is very unsuitable for poor soils. Its straw is hard and stiff, and makes an unpalatable fodder, and its grain contains an exceptionally high percentage of husk, and yields a proportionately small quantity of meal. It can only be recommended for cultivation in the special circumstances described, and under these conditions it possesses a quite exceptional value.

10. The Potato, Longhoughton, and Hamilton oats resemble each other very closely in their general characters and value. On the very best soils they are inferior in grain-producing power to the varieties named in No. 1, but on good medium soils they are only surpassed by the Banner and the Waverley oats in total value of both straw and grain. Of the three varieties the Potato has given generally the more valuable crops on a wide range of good soils, but it has not done well on the poorer soils. The Hamilton is superior as a straw producer, and it has shown a greater suitability for the poorer soils, on which it has given better crops than the Potato oat, and still better than the Longhoughton. The straw of all these varieties possesses fair standing power, and makes good fodder. Their grain gives about an equal yield of meal, and it has been found by analysis of the meal of the Potato oat that it is of distinctly higher nutritive quality than that of some of the new varieties of oats, being especially rich in oil.

11. On the poorer soils the largest and most profitable crops were produced by the Sandy and the Tam Finlay oats. On these soils they gave as much or more grain than any of the other varieties, while they considerably excelled them in yield of straw of a higher fodder value.

12. Of these two oats the Sandy possesses the greatest general value. It excels in earliness, in hardiness, in adaptability to soils, and also in yield of grain and of meal; and, while both oats are readily beaten down by storm, the Sandy stands somewhat better than the Tam Finlay. It is the preferable oat of the two for general purposes, and especially for late or stormy districts and for soils of fair productiveness.

13. The Tam Finlay oat is remarkable for its great tillering power, and for its consequent large yield of straw of fine fodder quality, in which it somewhat surpassed the Sandy as well as all the other oats. Its special adaptation is to poor soils in early and sheltered districts, where it will give a moderate yield of grain along with abundant straw. The observations of farmers point to a special suitability of this oat for growth on cold moist clays. On very rich soils it has, however, also shown itself capable of giving a high yield of a light grain. Its value is greatly reduced by its extreme lateness at harvest, and by the readiness with which it is beaten down by storm and rain.

14. The plants of the oat crop possess such a power of adaptation that even a considerable variation in the quantity of seed sown produces little effect on the total yield of crop, though it causes some variation on the weight and character of the individual plants composing it.

Professor M'Alpine's Report.

One of the most interesting and suggestive papers that have been produced in the domain of agricultural botany is supplied by Professor M'Alpine in his "Report on the botanical aspects of the Oat-variety Investigations, as shown by the experiments made in frames set in the fields."

The frames used for this investigation were made of metal, representing the four sides of a box without bottom, and sunk into the soil of each of the $\frac{1}{10}$ -acre plots on the fields where the oat varieties were planted. They were 1 foot square in area, thus forming a representative sample of the field cut off from the rest laterally, though in every respect subject to the same conditions as the rest of the field. In each frame there were planted 25 seeds, representing a seeding of $2\frac{1}{2}$ million seeds per acre, which was the rate used for all the $\frac{1}{10}$ -acre plots under experiment.

The produce of these 1-foot square areas was investigated in minute detail so as to provide information of a measurable kind in a great many interesting directions, but chiefly as regards (1) germination, (2) tillering power, (3) length and stoutness of straw, (4) number of spikelets per ear. Each of these departments of investigation is treated in a masterly manner, opening up questions full of interest and instruction to the agriculturist, and expressed in a clear, concise, and popular style, so as to form very pleasant as well as instructive reading.

Germination.

As regards germination, it was found that the seeds germinated very differently on the different farms, ranging from 97 to 50 per cent, due to the different kinds of soil. If put in a germinating apparatus all the seeds would have germinated, but when sown in the field, however carefully, only a certain proportion survive, not on account of accident, but simply on account of the ability of the soil to produce only a certain number of plants in a given space. The author describes these soils where the germination was low as "thinning soils," and in these it is not possible by thicker sowing to increase the numbers of seed which become plants. On the contrary, an increase of plants may be obtained by reducing the amount of seed sown. "The strongest plants alone survive (when too much seed is sown), and even the survivors are so cranky and touchy that if their root-space is threatened in the ground, as it may well be on specially thin land, or, more especially, if their leafy shoots at all shade one another, they succumb,—hence the occasional increase from thinner sowings."

Here we must distinguish between two different uses of the word *germination*. As usually employed, and as determined in a germinating apparatus, it means the number of seeds that are *alive*—whose embryos have sufficient vitality to burst the pickle and produce the beginnings of a plant under the most favourable conditions. As determined in the field-frames, it means the number of seeds capable of producing plants and surviving under the natural conditions of the farm.

The frame experiments also showed that three varieties of oats excelled the others under the adverse conditions of germination—viz., *Potato*, *Sandy*, and *Hamilton*. These he describes as “hardy oats.” “Natural selection has been at work for long in our old varieties, killing off the weaklings and adapting the survivors to withstand the strains put upon them by adversity. Thus it comes to pass that hardihood has now become incorporated into their very spirit, whereas the new breeds have yet to be tried and refined by affliction.”

Tillering.

As regards tillering, it has been shown by the frame experiments that the character of the soil has a powerful effect on this also. On some farms each seed produced on an average three straws, on others only two straws, while on others only an average of about one straw.

But tillering power is also inherent in the nature of the seed, and in this respect also the old varieties, *Tam Finlay*, *Sandy*, and *Hamilton* take the lead. The eight varieties stand in the following order:—

	Shoots per 100 plants.
Tam Finlay	243
Sandy	205
Hamilton	180
Newmarket	162
Potato	151
Loughoughton	151
Waverley	146
Tatar King	141

Inasmuch as the best tillerers are not the heaviest croppers, the author proceeds to consider the question of tillering, and advances a view of the subject which is very ingenious, and has much to say in its favour. Good tillerers produce many leafy shoots at the base of the straw that never come to anything, but remain as barren leaf-branches. These, though rooted on their own account into the earth, are yet connected with the main axis of the plant from which the straws spring, and he regards these not as a source of weakness, diverting nourish-

ment which might have been utilised in increasing the number of straws, but as feeders to the straws already formed. To quote his words: "It may, indeed, be taken that these barren leaf-branches, destitute of straw and ear, play the part of feeders to the straw connected with them, drawing from the earth as from a spring an extra supply of mineral matter, drawing from the air an extra supply of gas for making starch and sugar, drawing from the sun, which bathes them with its light and heat, an extra supply of power, and all this to make an extra supply of meat and drink for the straw, with which they are so intimately connected." On a rich soil and during a favourable season this extra supply of nourishment may not be needed by the main straw, and in that case the shoots are able to produce straws on their own account.

"The import of tillering," according to the author, "lies not so much in the possibility which it presents of yielding two or more straws per plant, and thus making good a deficiency of plants at the start, but rather in the assurance of safety which it gives that at least one straw and one ear of the best possible will be produced against opposing circumstances under conditions of adversity."

The new varieties, producing only about one straw per seed, he characterises as "fair-weather oats," having a more precarious life than those which are surrounded with grassy shoots "on which the straw may browse."

The average straws per 100 seeds sown he shows to depend both on the soil and on the variety of seed.

The length of the straws of different varieties, their weight and their calibre, are all noted and commented on. The number of spikelets on the ear and the number of grains in the ear are also shown to depend on the soil and on the variety of oat, and form interesting comparisons.

The author concludes his paper, which should be read by all students of agriculture, with the following remarks:—

What has been said above regarding the sharing out of the material of an oat plant, between the straw on the one hand and the grain on the other, ought to bring home to us the necessity of having at our command, and, more especially for certain classes of land, varieties of oat other than the ordinary kinds—varieties that have been specially selected, and specially bred to counteract the tendency of our common varieties to put an unprofitable amount of their substance into the straw—a likely case with those oats which have lost the balance between grain and straw, as shown by excessive number of spikelets per ear—a number which old varieties do not always fully utilise. Indeed, it is fairly correct to look upon our old varieties as having acquired by their history an excessive tendency to run to straw. If there are varieties of oat which can yield as much total crop as those at present in use, and which, at the same time, provide for us a larger proportion of that yield in the shape of grain, certainly that is an improvement, and a decided advantage. One of the

main objects of the oat experiment has been to pick out and to test the true powers of such varieties. The more or less deteriorated state of the ear of common oats is a plain fact, in need of no proof, due to our fickle climate, and to the circumstances of cultivation,—a plain fact which forces it upon us as an imperative duty either to remove the deterioration from the ear, or to bring into use breeds new and not yet deteriorated. Every time a deteriorated breed is sown and grown a certain loss must accrue, because full advantage has not been taken of the powers of our land as they could have been displayed under the correcting and shaping influence of suitable and undeteriorated varieties of oats. This simply means that an oat plant is a machine for turning out grain and straw, that an equally suitable machine not deteriorated by use must be considered better than one that has become degraded. On a given land, a certain plant machine can, and does, turn out more valuable produce than another, for the one variety is better at the business than the other.

Why do we change our seed? Obviously and chiefly to get ears less deteriorated, which simply means larger yield of grain. If change of seed is one step in the right direction, why not go a further step and introduce to our fields suitable breeds not deteriorated at all? We must not, however, be too precipitate in such innovations, but, by trial, we must first assure ourselves that the new breeds and the new policy are more profitable than the old.

The seasons will be uncertain, the yields will be uncertain, but that is no reason for starting with a variety already deteriorated, and thus making bad worse. If it is vain to expect the best yield from land left uncultivated, it is equally vain to expect the best from varieties of oats left uncultivated. In a word, oat varieties are like land: both require culture, the one by selection and crossing, the other by plough and harrow. If we utilise land cultivation, we must also make full use of varieties of oats properly selected and bred. Here, as elsewhere, "union is strength," the union of a good breed of oat with well tilled land: from both together we have right and we have reason to expect maximum yield and maximum profit.

THE MANURING OF MARKET-GARDEN CROPS.¹

Considering the increased extent and growing importance of market-gardening in recent years, it is extraordinary how comparatively little attention has been given to the manurial treatment of the great variety of products comprehended in this important branch of agriculture.

Situated as market-gardens are in the immediate vicinity of towns where stable manure is plentiful, the old custom of relying on the application of dung for the growth of all kinds of vegetables and fruits has remained comparatively undisturbed during these latter days, when the use of fertilisers in ordinary field agriculture has been extending in an ever-increasing ratio. Since the products of the garden are chiefly conveyed to the town market in carts, it seems economical that the carts that would otherwise return empty should bring back with them

¹ By Bernard Dyer, D.Sc., and F. W. E. Shrivell. Published by Vinton & Co., Ltd. Price 1s.

loads of dung, and where dung can be bought cheaply it is the practice to use it in very large quantity. Not only does spade-culture favour the incorporation with the soil of large quantities of dung, but there is a pretty general belief in the superiority of dung over all other kinds of manure, and also an opinion that there is almost no limit to the amount of it that may be advantageously applied to the land if it can only be got cheap enough.

Recent experiments in the science of manuring concur in showing that the limits of profitable dunging can easily be reached, and that dung when applied too thickly to the land is not only subject to rapid deterioration itself, but that it may actually cause the decomposition and loss of the nitrates present in the soil as the result of the natural nitrification of its store of organic matter.

On these accounts one must welcome the appearance of a pamphlet that has been issued by Dr Bernard Dyer and Mr F. W. E. Shrivell giving an account of a long series of experiments on the manurial treatment of market-garden crops that has been quietly carried on by them for about ten years at Hadlow Experiments Station, on a farm a few miles from Tonbridge.

The experiments were undertaken at the instance and expense of the *Permanent Nitrate Committee*, with the view, no doubt, of demonstrating the value and importance of nitrate of soda as a fertiliser and as an advertisement for their business; but the experimenters, while putting in the foreground as much as could be said favourable to the use of nitrate of soda, have taken a wider view of the subject and compressed within small space much information in regard to the general manuring of garden crops. The general plan of the experiments was to find answers to the following questions:—

Is it more economical in the case of any particular market-garden crop to use light or heavy dressings of purchased dung (stable manure)?

How far can purchased dung, with due regard to economy, be partially replaced by simple chemical fertilisers?

Assuming nitrate of soda to be the nitrogenous fertiliser employed, what quantity is it most economical to use in conjunction with phosphates and with or without potash in partial replacement of dung?

Is it possible economically to dispense with dung altogether, and to get as good a result simply by using chemical fertilisers?

The only nitrogenous manure employed in this investigation was nitrate of soda; the phosphates were restricted to two—viz., superphosphate, 4 to 6 cwt. per acre, and basic slag, 7 to 10 cwt. per acre—and the potash manures were either kainit, 4 cwt. per acre, or sulphate of potash, 1 cwt. per acre.

Their experiments have proved abundantly that the common practice of applying dung at the rate of about 25 tons per acre is an extravagant one, and where dung cannot be applied at

less cost than from 6s. to 8s. per ton, it is far more economical to employ half the quantity of dung and supplement it by the use of phosphates, potash manures, and nitrate of soda. There are some garden crops, such as celery and gooseberries, for which heavy dunging seems most appropriate, but they are exceptional. In almost all cases equally good, and in most cases better, results are got by the use of about 12 tons per acre of dung, with the addition of slag, phosphates, potash salts, and a due proportion of nitrate of soda. The amounts of nitrate appropriate to the different vegetables vary considerably, and it is to that question that the authors have devoted most attention. Some of the ranker and more leafy vegetables are benefited by very large doses.

Cauliflowers and Cabbages.

Thus cauliflowers, broccoli, and various kinds of cabbages, even when provided with small applications of dung, are improved both in quantity and quality by having 4 cwt. per acre of nitrate incorporated with the soil at the time of planting, and a further dressing of from 2 to 4 cwt. at later stages of growth. The less dung that is given the greater is the need of nitrate of soda, and what will surprise many is that these crops can be successfully grown without dung at all, but with an increased proportion of fertilisers, and that with positive advantage so far as the quality of the crop is concerned, especially as regards tenderness.

Brussels Sprouts.

This is also notably the case with Brussels sprouts, which are grown over extensive areas in the autumn near large towns. By the mere application of superphosphate, sulphate of potash, and 4 cwt. nitrate of soda per acre, the authors, at a cost of £3, 5s., grew larger and finer crops of Brussels sprouts than could be produced by the application of 25 tons of London dung, which in their district cost about £10 per acre, including all charges.

Lettuces.

Lettuces are shown to be another crop that can be most successfully grown without dung, and the quantity of nitrate of soda found sufficient for them did not exceed 2 cwt. per acre. The demands of that crop for potash are also very small. The authors show that by the diminished use of dung and its replacement by fertilisers, in almost all cases a saving of from £2 to £6 per acre can be effected.

Carrots and Parsnips.

Carrots and parsnips are best grown on land that has been moderately dunged for the previous crop, and in their case a large application of nitrate of soda is unnecessary, but it is found that potash salts form an important item of their manure mixture.

Celery.

Celery is a greedy crop, and they have found that it also is much improved in tenderness and crispness by the use of fertilisers.

Rhubarb.

The effect of fertilisers in producing high quality is also very distinctly shown in the case of rhubarb. When grown with 12½ tons of London dung and the addition of 4 cwt. superphosphate and 4 cwt. nitrate of soda, the average crop of rhubarb exceeded 40 tons per acre, while that grown with double the quantity of dung without fertilisers, but at one-third more cost for manure, yielded on an average less than 30½ tons per acre. Strange to say, the rhubarb crop, despite the great extent of its leafage, did not respond to the application of potash salts.

Tripoli Onions.

Quite the reverse has been the experience of the authors in their experiments with Tripoli onions. For them the addition of potash salts in their manure mixture when grown without dung is imperative. Its omission resulted in absolute failure.

Leguminous Crops.

Leguminous crops, such as peas and beans, have also received attention despite the fact that they are less dependent than all other crops on the application of nitrogenous manures. Their experience confirms that derived from the growth of the bean crop in the Highland Society's experiments twenty years ago, that the addition of a small amount of nitrate of soda to the manures applied with the seed is of great use in enabling the crops to pass successfully through the precarious stage of their growth when the store of nourishment in the seed is exhausted and the young roots have not yet developed so far as to enable the plants to obtain their nitrogenous food, as more recent experiments have shown, from the supply of nitrogen in the atmosphere.

Gooseberries and Currants.

A very important observation has been made regarding the manurial wants of the genus *Ribes*. It is shown that for the growth of gooseberries and currants the most efficacious constituent of the manure is potash, not only for increasing the quantity of produce but especially for improving the size and fineness of the berries.

Strawberries.

On the other hand, the authors show that the strawberry crop not only does not require potash manures but is actually injured by them. Their effect is to greatly diminish the yield and to retard the time of ripening. The latter injury is in the case of this, as of some other garden fruits, the more serious on account of the greatly enhanced price obtained for early strawberries. For early ripening of strawberries chemical fertilisers, including nitrate of soda, were found of great advantage.

Asparagus.

An interesting chapter is devoted to the culture of asparagus. This is a peculiar crop, and the closing remarks of the authors in regard to it may best be given in their own words.

After several seasons' experience, and after many comparative observations, we have not the slightest hesitation in saying that the tenderness, flavour, and general quality of the asparagus grown with the aid of chemical fertilisers have been markedly superior to those of the asparagus grown with the aid of London dung alone. This agrees with our experience recorded in connection with many other vegetable crops.

At no time during our experiments has the heavy dressing of town dung, costing £10 per acre, given any better results than the light dressing, costing £5 per acre.

Having regard to our general experience, we should be inclined to recommend for asparagus a light dressing of dung, not exceeding 25 loads (or, say, 12½ tons) per acre, supplemented by a dressing of from 4 to 6 cwt. of superphosphate, 4 cwt. of kainit (or 1 cwt. of sulphate of potash), and 4 cwt. of nitrate of soda per acre. The superphosphate and kainit (or sulphate of potash) should be applied in the winter, and the nitrate in the spring.

It should be noted that the direct effect of the manure is probably not to feed the shoots that are cut for market, but to encourage a vigorous season's growth in the vegetative shoots that are allowed to come to maturity after the cutting season is over. It is presumably owing to the metabolic processes carried on during this period that the plant stores up in its roots the nutriment necessary for producing, at the beginning of the following season, a rapid and vigorous growth of the shoots which constitute the crop.

In soils poor in lime it is not advisable to use superphosphate too often.

It is better to use some non-acid phosphatic manure such as basic slag or Peruvian guano or bone-meal, or the neutralised or so-called "basic" superphosphate introduced by Mr Hughes. The trouble with regard to manures of low solubility, for a crop like asparagus, is that the manure must always be applied at the surface, and cannot be dug in to any great depth as it can in the case of crops the roots of which are no longer required to remain undisturbed. For this reason, if we were constructing a fresh bed of asparagus in a soil poor in lime, we should be inclined, during the construction and trenching of the bed, to incorporate with both soil and subsoil a quantity of either basic slag or bone-meal as large as would be used collectively in several years' ordinary annual dressings. Where, however, there is sufficient lime in the soil, an annual dressing of superphosphate is probably all that need be used.

In asparagus culture, as in the case of all other crops, the market grower will probably like to vary the nature of his artificial or concentrated fertilisers from time to time; on which question, however, the reader is referred back to our introductory remarks on an earlier page.

The "remarks on an earlier page" here referred to are those in which the authors explain that the conditions under which their experiments are being conducted have prevented their extending the scope of their inquiry so as to include observations regarding the efficacy of many well-known and widely used fertilisers, especially of a nitrogenous kind, which might possibly be preferred in certain circumstances and for different soils.

The authors give recommendations as to the kind and quantity of manures that are suitable for the different crops derived from their experience, but these must be taken as having reference to the particular kind of soil in which their farm is situated—viz., "a poor loam of lightish colour resting upon a deep bed of heavy clay." They give an analysis of the soil which shows that it is deficient in lime and phosphoric acid, and also below par in nitrogen. The amount of potash is perhaps a little over average, but its "availability," and also that of the phosphoric acid as determined by the solubility of the potash salts and phosphates in a 1 per cent solution of citric acid, is very slight. It is a soil which would require years of manuring with dung to convert it into a typical market-garden soil, and the authors have therefore done the right thing in withholding their report until they have had ten years' experience.

It is unfortunate, though not unnatural, that as regards the great mass of the field work of a manurial kind now going on all over the country, those who are supplying the funds for their maintenance are impatient for results long before the work is ripe, and the investigators are tempted to produce reports of a crude and unconfirmed kind, leading to conclusions which future experience, at much cost and trouble, is bound greatly to modify, if not entirely to refute.

There is evidently a wide field for experiment in the manuring

of market-garden crops, and much of the time and money now being spent in repeating over and over again well-worn and fairly well-exhausted lines of research in field agriculture might with much private profit and public benefit be diverted towards the growth of the *small-culture* crops produced in market-gardening.

That is a branch of agriculture whose extension is much to be desired for many reasons. Not only does it encourage the consumption of a great variety of wholesome kinds of vegetables that have hitherto formed too small a part of the food of the people, but it gives employment to a larger number of workers per acre of land than do other branches of agriculture, and it is less liable to be dumped out of existence by foreign competition than are the great departments of agriculture engaged in the production of grain and flesh.

THE COUNTY DEMONSTRATION FARM, COCKLE PARK, MORPETH. Seventh Annual Report, 1903.

The interesting experiment to determine the improvement of pasture by the feeding on of cakes and the application of manures, and the gauging of the improvement by the progress made by sheep pastured on the different plots, continues.

The precise treatment of the various plots is described in the former volume of the 'Transactions,' and general indications will suffice here to enable the reader to compare intelligently the data contained in the table on the following page.

These estimated grazing values show far greater differences than are shown by the live-weight increase per head during the last season, and if they are to be relied on, would indicate that the money expended on manuring the plots had been a very profitable investment. But the "estimated grazing value" is at best an approximation, regarding which no two valuator would agree exactly, and so much under the influence of fluctuating conditions that the values ascribed by the same valuator would vary very greatly from time to time.

These tables deserve careful attention and convey much information. The number of sheep put upon each plot is determined by the appearance of the grass. The grazier judges what number he thinks the grass can fairly sustain, and as that is a matter on which opinions may vary it introduces an element of uncertainty. The greater number of sheep put into a plot which at the end of the season is not eaten bare but has a considerable degree of roughness, the greater the amount of live-weight increase will be got from it, and therefore the total live-weight increases are not a very accurate gauge of feeding quality.

Plots	1	2	3	4	5	6	7	8	9	10	11
	Decorated cotton-cake, 1897, 1898.	4 tons lime, 1897.	10 tons basic slag, 1897.	5 tons basic slag, 1897; again, 1900.	7 cwt. superphosphate, 1897; again, 1900.	Unmanured.	Superphosphate and potash sulphate, twice.	Superphosphate and ground lime, twice.	Superphosphate and ammonia sulphate, twice.	Dissolved bones, twice.	15 cwt. basic slag, 1900.
<i>Number of Sheep per Plot.</i>											
1897	9	8	8	8	8	8	8	8	8	9	.
1898	10+1	9	10+3	8	8	6	8-1	8	8+2	8+2	.
1899	8	6	12	9	8	6	8	8	8	8	.
1900	8	6	9-3	8-1	9	6	9	9+2	9	9	8
1901	6	6	9	9	9	4	9	9-3	9	9	9+3
1902	5	6	9	9	9	4	9	10	8	9	12
1903	11	5	9	10	9	4	9	10	8	9	10
<i>Live-weight Increase of Sheep per Acre.</i>											
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1897	80	32	77	44	56	37	72	69	79	59	
1898	144	64	171	113	104	53	121	119	94	117	66
1899	106	47	211	113	103	48	107	114	109	106	53
1900	80	60	131	139	137	44	137	159	123	134	89
1901	51	41	105	107	115	23	113	144	98	100	131
1902	71	68	127	146	127	41	135	164	120	139	135
Total	532	312	822	682	642	246	685	769	628	655	524
<i>Live-weight Gain per Sheep per Week.</i>											
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1897	1.9	.7	1.8	.	1.3	.9	1.7	1.6	1.8	1.4	
1898	2.0	1.2	2.2	2.1	1.9	1.3	2.1	2.2	1.5	1.9	1.6
1899	2.0	1.1	2.6	2.1	1.9	1.2	2.0	2.1	2.0	2.0	1.3
1900	1.5	1.5	1.7	2.2	2.3	1.1	2.3	2.4	2.1	2.2	2.1
1901	1.3	1.0	1.7	1.8	1.9	.9	1.9	1.9	1.6	1.7	1.8
1902	2.1	1.7	2.1	2.4	2.1	1.5	2.3	2.5	2.2	2.3	2.3
Average	1.8	1.2	2.0	2.1	1.9	1.15	2.0	2.1	1.9	1.9	1.8
<i>Estimated Grazing Value of Pastures per Acre.</i>											
1902	12	10'	20	21	20	5	20 6	22 6	17	19 6	25'

The live-weight gain per head is much more reliable as a gauge of feeding quality, and it deserves special attention; for it is

explained that there was plenty of feed on all the plots to maintain the number of sheep on them in as good condition as the kind of grass would permit, and that which was left uneaten at the end of the season was eaten off by store cattle during the winter.

Plots 3, 4, and 8 take the lead. In estimating the live-weight gain per head on plot 4 the first year's grazing should not be considered, as it is evident the small application of 5 cwt. of basic slag had not had time to reach the soil and produce any effect that season. The second application of 5 cwt. three seasons later is now telling very well, and perhaps two applications of 5 cwt. in consecutive seasons may be a better way of applying slag than a full dose of 10 cwt. at once. Time will show, and perhaps three years hence the experiment will be sufficiently ripe for yielding a report of permanent value. The application of lime alone is a failure on that land, but along with superphosphate, as on plot 8, it has a most beneficial effect. It would appear that the effect of the lime is to precipitate the superphosphate in a more available form than it would be if allowed to be rendered insoluble by the oxide of iron and alumina present in the soil, which is a stiff clay resting on boulder-clay.

The Value of Roots in Cattle-feeding.

The importance of diminishing the quantity of roots fed to cattle appeals to farmers during seasons when the turnip crop is a comparative failure, but even in ordinary circumstances the question of reducing the acreage under what is undoubtedly an expensive crop and the substitution of an equivalent of some other kind of fodder is an important one, and any well-conducted experiment to test the relative value of roots and such foods as may be substituted for them provide very useful information.

For this purpose Professor Middleton has been carrying on an experiment for two years at Cockle Park, and as every care was taken to reduce all sources of error, the conclusion arrived at may be considered reliable.

The substitute he used for swedes was a mixture of hay, maize-meal, and treacle.

In 1901 he used two lots of 8 cattle each: Lot I. was fed on 56 lb. swedes along with other food, and Lot II. on half that quantity of swedes, but as a substitute for the 28 lb. of swedes the cattle got $2\frac{3}{4}$ lb. seeds hay, $\frac{1}{2}$ lb. maize-meal, and $\frac{1}{4}$ lb. treacle. So far as progress was concerned the two lots did equally well, but the cost was greater in the case of Lot II. eating the smaller allowance of swedes.

The turnips were valued at 6s. 8d. per ton, and the substi-

tuted mixture cost at the rate of 9s. 8d. per ton of swedes saved.

A similar experiment, which is really an extension of the former one, was carried out in 1902. In this case one lot of 8 cattle was put upon a diet the same as that of Lot II. of the former year—viz., 28 lb. swedes with the mixture of hay, maize-meal, and treacle, and another lot of 8 cattle, which may be called Lot III., was given no swedes at all but a double allowance of the substituted mixture. In this case the cattle that got no turnips did not do so well.

The substitute cost 9s. 8½d. per ton of swedes saved, so that at the end of 166 days' feeding the lot that got no swedes were worth 7s. 2d. less money per head.

Professor Middleton concludes as follows:—

Well-bred yearling cattle may be fattened without roots on the ration given to Lot III., but this ration is not recommended. At least 28 lb. of swedes should be fed daily, and 42 lb. to 56 lb. may be given with profit.

During the fattening period live-weight increase was made at a cost of 44s. 6d. per cwt. for Lot II and 51s. per cwt. for Lot III. The cattle were very good, and as the ration fed to Lot II. was a moderately good one it is not easy to see how the cost of producing beef in yearlings can be less than 40s. per cwt. in winter. If it does cost this sum, it is clear that farmers who hope to make anything out of feeding cattle must pay much less per cwt. for "stores" purchased in autumn than they expect to make for fat cattle sold in spring. In this case the stores were valued at about 30s. per cwt. live-weight, and the fat cattle brought in 39s. 5d. per cwt.

The effect of Nitrogenous Manures on the Feeding Value of Hay.

This subject, regarding which much difference of opinion prevails, formed the basis of an experiment by Professor Middleton at Cockle Park in 1902. Manurial experiments of former years showed very pronounced differences in the appearance of seeds hay, according to the kind and amount of nitrogenous manures applied, and the practical question arose as to how the feeding values of the different crops of hay corresponded with their apparent value.

To answer this, five lots of 10 sheep each were carefully selected and fed on five qualities of seeds hay of the following kinds:—

No. 1. Seeds hay from unmanured land—a fine crop of about 3 tons per acre mixed clover and ryegrass, well got and of first-rate quality.

No. 2. Hay from the same field top-dressed with 2 cwt. nitrate of soda per acre in April. It was cut fourteen days earlier than the former, and weighed 10 cwt. per acre less.

No. 3. The same as No. 2, but cut fourteen days later—viz., at the same time as No. 1.

The sheep were kept under observation for 56 days before the experiment began, and on a definite preliminary diet. They were then fed under the experiment for upwards of 100 days. Five out of each lot were considered fat enough for the butcher, and these were killed and their products recorded.

The principal conclusions arrived at by Professor Middleton were that no difference in feeding value was found between hay that had been dressed with nitrate of soda at the rate of 2 cwt. per acre and hay of the same field that had not been top-dressed. The hay top-dressed with nitrate, and cut a fortnight before it was ripe, proved no better than that cut when ripe; but perhaps the earlier cut hay suffered a little from rain which occurred during hay-making.

The other two lots of 10 sheep each (Nos. 5 and 6) were used to see what difference there was in the feeding quality of aftermath hay got from the part of the field that had been top-dressed and that which had not.

The former consisted chiefly of ryegrass and the latter chiefly of clover. As might be expected, the top-dressed aftermath was not so good. It was found to be worth from 12s. to 16s. per ton less than the other for sheep-feeding.

Although lots of only 10 sheep each were all that were used for these tests, Professor Middleton considers it desirable that in such experiments there should be 16 to 20 sheep in each lot, in order to diminish the error due to the extraordinary vagaries as regards fattening propensities of sheep even when selected with the greatest care.

Uncorticated Cotton-Cakes.

There are also recorded in this report feeding experiments to test the relative economy of feeding with Egyptian and Bombay uncorticated cotton-cakes. The former is made from a large seed, and the cake is very free from cotton fibre, while the latter is made from a small seed thickly matted with cotton fibre. The abundance of cotton fibre in the Bombay seed is such as to recommend very great caution in feeding it, especially to young stock, owing to the tendency of fibrous material of that kind to agglomerate in the intestines and cause stoppage. It would seem, however, that this tendency is not so much to be feared in the case of Bombay cotton seed, and no accidents have occurred in the few experiments as yet made with it. Should further trials show that this cake can be consumed even by young stock without danger to health, it will be a fortunate circumstance; for the quantity of this seed now imported from India has increased above fifty-fold in three years, and it is rapidly rising in favour. It may not be so palatable or so much relished by cattle as the Egyptian variety, but it has a great advantage over the other on the score of cheapness; and the feeding experiments at Cockle

Park, so far as they have gone, seem to show that it is quite as good as, if not better than, the Egyptian undecorticated cake in feeding quality. Further experiments in this direction are required.

AGRICULTURAL DEPARTMENT OF THE DURHAM COLLEGE OF SCIENCE, NEWCASTLE-UPON-TYNE.

Eleventh Annual Report.

In this report are published the results of experiments on the manuring of old-land hay. Eleven of these have been in progress for seven years or more, and five have just been newly put down. The centres chosen for this investigation are of different geological formation, and the results obtained acquire additional value from that circumstance. They show that the system of manuring that suits one kind of soil differs sometimes very widely from that which suits another, and bring into prominence the mistake that is frequently made of recommending certain kinds of manurial treatment for crops without taking into consideration the character of the soils on which the crops are grown, and they emphasise the importance of trusting to local rather than to general experience in such matters. In establishing experiments in representative localities over the northern districts of England, the Durham College is engaged in most profitable and instructive work.

Seeing that the work has been going on for eight years or more, the lessons derived from them, as gathered together by Professor Douglas Gilchrist, are deserving of acceptance, and these may be summarised as follows:—

Manuring of Old-land Hay.

1. *Nitrogenous manures.*—Nitrate of soda and sulphate of ammonia are seldom profitable, but where they are found useful very small doses are to be preferred.

2. *Phosphatic manures.*—These are generally most useful. Slag has given best results on poor stiff boulder-clay and loams derived therefrom. On peaty soils also it was found that a mixture of slag and superphosphate was most appropriate. Superphosphate suited best the sandy soils derived from the millstone grit; but manures which are both phosphatic and nitrogenous—such as bone-meal, dissolved bones, and fish-meal—were of great general utility, and a combination of all the phosphatic manures used gave best results of all except on the heavy soils.

Potash manure was of little use unless in combination with other manures, and was chiefly useful on millstone-grit soils.

Lime applied in small quantities (6 cwt. per acre) in alternate years reduced the crop in all cases; but at one centre a single dose of 4 tons per acre on a peaty loam, applied the previous winter, increased the hay 13½ cwt. per acre.

Farmyard manure gave good results on dry sandy soils and light loams, but not on heavy soils already well provided with organic matter.

Time and method of applying manure.—Slag should be applied in the late autumn, and if there is much old foggage in the meadow it should be broken up with heavy toothed harrows to enable the finely ground slag to find its way to the soil. It should not be sown after rain lest it float into lumps.

Potash manures and all insoluble phosphates should be applied in autumn, and even superphosphate may be then applied without disadvantage. Farmyard manure should also be put on the grass in autumn.

THE ESSEX FIELD EXPERIMENTS.

These experiments have been proceeding for eight years on a great variety of farms scattered over the county. They are under the auspices of the Essex Education Committee, and under the direct superintendence of Mr T. S. Dymond, F.I.C., assisted by Mr B. W. Bull, N.D.A.

They are manurial experiments applied to beans and other leguminous plants, and intended for the instruction of local farmers. The soils are chiefly of a chalky nature resting on boulder-clay.

It is the custom in Essex to manure beans and leguminous crops with dung, but the experimenters find that dung alone is a poor manure for such crops, but that great advantage results from giving, in addition to dung applied in autumn at the rate of 12 tons per acre, a manuring of about 4 cwt. superphosphate. In addition to superphosphate, sulphate of ammonia and kainit were tried; but it frequently happened that they did more harm than good, especially when dung was also used. Basic slag was found to be just about as good as superphosphate, but usually the latter was more advantageous.

It seems probable, from the results of these experiments, that the authors would derive much information from an extended use of lime manures—viz., lime itself, sulphate of lime, basic superphosphate, and on soils already well supplied with lime an application of supersulphate of lime, which is just sulphate of lime to which sulphuric acid has been added so as to form a convenient dry manure in good friable condition. The application of nitrate of soda instead of sulphate of ammonia in very small quantity, so that its action is soon over, would probably be found advantageous for leguminous crops generally, and especially for

the bean crop, which needs nitrogenous manures only in the early period of its growth; and the bean and pea crop are especially improved by the application of lime manures of an easily assimilable kind.

In experiments on a rotation of beans, wheat, barley, and clover hay, with the application of manures to the bean crop only, the barley crop suffered from the want of a quickly acting nitrogenous manure such as nitrate of soda.

A comparison of nitrate of soda and sulphate of ammonia as a nitrogenous manure for the *oat crop* gave results distinctly in favour of the latter.

UNIVERSITY COLLEGE, READING.

Ninth Annual Report.

Feeding Quality of Mangels.

A feeding experiment with cows to determine the different effects of different kinds of mangels on the character of milk produced has elicited some points of interest that the experimenters neither expected nor intended. There were four different kinds of mangels along with other food consumed by four pairs of cows, and each pair of cows was fed for a fortnight on one variety, for the next fortnight on a second variety, and for the third fortnight on a third variety of mangels. Greater scope should have been allowed the organisers of this experiment. Two cows are quite an insufficient number to use for such an experiment; and even if the number had been sufficient, the differences desired to be noted could not have been found with any certainty in passing from one food to another in the short space of a fortnight. Food takes nearly a week to travel through the long alimentary canal of a cow, so that vestiges of former feeding require about a week for their elimination. Moreover, sudden changes of diet always produce some alimentary disturbance which requires time for its disappearance. Cows must have time given them to get into equilibrium with their changed diet before constant results can be attained. A week should be spent in changing from one diet to another, and one week more would be needed to attain equilibrium, and only then can the experimental data begin to be of any value. But although the main objects of the experiment were not attained, some useful observations were made.

The cows were milked at intervals of 15 hours and 9 hours—viz., at 6.30 A.M. and 3.30 P.M. The quantity of milk given by the cows after the long night's rest was about half as much again as that given in the afternoon. As regards quality, that secreted during the long interval was usually much poorer in

fat than that produced during the short interval, although the total yield of milk-fat was greater in the former case. Not unfrequently, however, it was found that a cow would give richer milk in the morning than in the evening, and indeed the milk of individual cows was subject to frequent vagaries that remained inexplicable. The milk-giving power of two of the cows of the same age, that had produced the same number of calves and that had on the last occasion calved on the same day, were extraordinarily different. One produced during six weeks 1363 lb. milk containing 45 lb. of butter-fat, and the other produced only 761 lb. of milk containing 25½ lb. of butter-fat, thus proving that it is far more important to have a good milker than to have the most milk-producing food on which to feed her. Most of the cows were between their second and third month after calving, and at that period the quality of the milk was at its poorest. As regards the percentage of fat, it was found that the morning milk was usually under 3 per cent. Out of the 42 mornings included in the experiment the milk of the individual cows was under 3 per cent of fat, as follows:—

Cow 1 on 15 mornings.

"	2	"	24	"
"	3	"	31	"
"	4	"	15	"
"	5	"	40	"
"	6	"	1	"
"	7	"	41	"
"	8	"	39	"

And there were only four mornings in the 42 on which the total mixed milk of the eight cows attained or exceeded the 3 per cent limit. On the other hand, the evening milk of the eight cows when mixed had always above 3 per cent fat, although there were individual exceptions. As regards the total weight of butter-fat produced, more butter-fat was got from the morning milk than from the evening milk, but it was noted in the case of one cow that the butter produced from its evening milk exceeded that got from its morning milk on twenty-nine occasions.

The recommendations of the experimenters are—

That the intervals between milkings should be as nearly equal as possible.

That where the period of lactation is unfavourable, or where other causes lead to the production of milk deficient in fat, one or two Jersey cows to each batch of ten shorthorns would be useful in keeping up the standard of fat.

That excess of watery roots should be avoided.

That the milk of individual cows should be examined from time to time so that poor milkers may be eliminated.

That an addition of concentrated food is very much to be recommended when cows are feeding on mangels.

MILK RECORDS.

By JOHN SPEIR, Newton Farm, Glasgow.

THE advisability of the Highland and Agricultural Society giving assistance to local societies for the purpose of having tests of the milk produce of herds carried out systematically, on the plan introduced a few years ago in Denmark, came up for discussion at a meeting of the Board of Directors in February of last year, in connection with a motion brought forward by the writer. The matter was remitted to a committee for consideration, and it was ultimately decided to proceed with the scheme in any of the breeding districts which might desire to participate in the work. The Directors set aside a sum of £200 to carry on the work in 1903 under conditions which were adjusted later on.

The detailed scheme is set forth as follows:—

With the object of encouraging and assisting the breeders and owners of dairy stock in keeping records of the milk-yield of their cows, the Highland and Agricultural Society (referred to hereafter as the "National Society") has adopted the following scheme:—

It is intended that experts, to be employed for the purpose, will visit certain herds in turn and take records of the weight and composition of each cow's milk.

Each herd will be visited at intervals of two weeks, so that one expert will overtake twelve herds.

The expert will arrive at the farm in time to be present at the milking in the evening, and will stay overnight at the farm and attend at the milking in the morning. Each cow's milk from the two milkings will be weighed and its composition tested by the expert.

Forms upon which to record the results of each test will be supplied by the National Society, one copy of the filled up form to be sent to the National Society and another to the Local Committee. A third copy will be retained by the expert till the end of the season, and then delivered to the Local Committee.

Where practicable, particulars as to the live-weight of each cow, and the kinds and quantities of food given daily (apart from field pasture), should be entered upon the form.

It is intended that the test will begin as early as possible in spring, and continue till the end of October.

The assistance of the National Society is given on the condition that the Society receives, and is to have the right to publish, the records of all tests made under this scheme.

The National Society will provide the appliances for weighing the milk and testing its composition, and will pay half the cost of these appliances. The Local Committee will pay the other half and retain the appliances as their property.

The expert for the conducting of the tests will be appointed by the Local Committee, subject to the approval of the National Society. The expert will be paid a salary exclusive of his board and lodging and

travelling expenses. Provided the conditions of this scheme are complied with, and the National Society is satisfied with the manner in which the work is conducted, the National Society will contribute a sum equivalent to two-thirds of the salary of the expert. The Local Committee will pay the other third, defray travelling and other necessary local expenses, and arrange for the conveyance of the expert from farm to farm.

All tests under this scheme must be arranged at the instance of a Local Committee or Local Society approved of and registered for this purpose with the National Society.

Local Societies desirous of conducting similar tests under arrangements differing from those detailed above, are invited to make their proposals known to the Secretary of the National Society. If the arrangements meet with its approval, the National Society may give a grant in aid of the expenses. In all cases such grants will be subject to the condition that detailed results of the tests are supplied to the National Society with the right of publication.

For carrying out the foregoing scheme in the current year (1903), a sum not exceeding £200 has been voted by the National Society.

Local Societies or Local Committees desiring to avail themselves of the provisions of this scheme should, without delay, communicate with the Secretary of the National Society.

There were several applications for assistance, and ultimately arrangements were made with the Ayrshire Farmers' Society, the Dumfriesshire Dairy Farmers' Association, and the Wigtown Dairy Farmers' Association for working the scheme in these counties. In Ayrshire eleven herds were tested in the parishes of Maybole, Monkton, and Tarbolton. In Dumfriesshire eleven herds were tested in the parishes of Sanquhar and Thornhill, and in the district around Dumfries. All the Dumfriesshire farms lay along the valley of the Nith, and at no great distance from the Glasgow and South-Western Railway, which was utilised for conveying the man in charge from one district to another. For Wigtownshire a group of twelve herds were chosen, with Stranraer as the centre.

For some years a small society at Fenwick, Ayrshire, has tested the milk of a few cows entered for special competitions. This society made application for a grant, and it was ultimately agreed to give it assistance, provided the tests were made at least once a-month and in accordance with the Society's scheme.

The work in the Ayr district was put in charge of Mr Thomas Howie, jun., Fairfield Mains, Monkton. Mr John W. Dunlop, Gree, Fenwick, took charge of the Dumfriesshire district, and carried on the work for eighteen weeks, when he left to attend college. Mr Peder Rasmussen, the son of a Danish farmer, who was in this country at the time and who had done similar work in Denmark, took up the position vacated by Mr Dunlop, and carried the work out till the end of the season. The Wigtownshire district was in charge of Mr Jacob Sejr Trier, another Dane, who carried it on from beginning to end. At

the Fenwick centre, where only eleven cows were tested, the work was in charge of Mr James Dunlop, Midland, Fenwick.

By the end of October a few of the cows were dry, and many of the others were giving so little milk that it was considered inadvisable to continue the work any longer. As soon as the work was finished each recorder sent in his daily sheets and books, which were placed in the hands of a professional accountant who checked all the calculations.

For ease of comparison each recorder had been instructed to reduce the yield of each cow at every test from its original composition to lbs. of milk of 1 per cent of fat. By this arrangement all milk was reduced to the same standard, so that in comparing the yield of one cow with another the weight alone had to be taken into account in estimating which was the most valuable. In such an enormous number of calculations it was not to be expected that the recorders would be able to carry them out without occasional errors, and it was in order to have the results made as reliable as possible that the whole papers were put into the hands of a responsible accountant.

The tables and calculations made out by me have in nearly every case been checked either by others or by myself. The time and labour involved in making out the various tables from such a mass of figures have been considerable; and while the work was more hurriedly done than was desirable, it is hoped that although absolute accuracy may not have been attained the tables are sufficiently accurate for all practical purposes.

In the preparation of the tables for this report the yield of each cow or group of cows has been calculated on a basis of 3 per cent of fat. This should make the tables more interesting and intelligible to the average man than stating the amounts in lbs. or gallons of varying percentages of fat, or gallons of milk of 1 per cent of fat, although before the 3 per cent figures can be arrived at the milk must all be reduced to that of milk containing 1 per cent of fat. The weight of all milk was taken in lbs., and for ease of calculation one gallon was calculated as being equal to 10 lb. The fat was determined by the Gerber tester, the bottles used bearing the Government stamp.

The rate at which the milk is valued—viz., 5d. per gallon—may at first sight seem low, but when it is remembered that it is summer milk alone that is being dealt with, that the farms were often a long way from any populous centre, and, above all, that it is milk of only 3 per cent of fat which is valued at this rate, it will be found that the figure adopted is probably as near the commercial value for either butter or cheese as any other. To make 1 lb. of butter from milk of that quality about 3 gallons will be required, and if the by-products are valued at 3d., 1s. per lb. is left for the butter. To make 1 lb. of cheese

from milk of 3 per cent fat requires from 12 to 13 lb. of milk, so that at least 6d. per lb. will require to be made from the cheese to give an equivalent of 5d. per gallon, even where a trifle is allowed for the whey.

The principal object of the scheme was to authoritatively indicate the most profitable and least profitable cows in each herd, so that the owners might discard the latter and breed only from the former. The sheets for each herd, at the end of this paper, show distinctly the great importance—even the necessity—of such a method of selecting dairy cows for breeding purposes. It was too late before the work was begun last summer to get the very best results, but sufficient has been done to indicate the value of this form of test, and to emphasise the advisability of its continuation and extension.

While in a general way the yield of one herd may be compared with that of some other herd, it is undesirable that too much reliance should be placed on such a comparison. In each of the districts some of the farms are situated at a much lower altitude than others, and some are in early and rich districts while others are in poor and late parts, so that uniformity of results could not be looked for. The object sought for, and the main aim of the scheme, *was to obtain a means of comparing cows of the same herd, calving at or near the same time, going on the same pasture, and subjected to the same climatic conditions*, rather than comparing one herd with another. The latter is quite a legitimate subject of inquiry if the conditions are alike or nearly so, but not otherwise. In the higher and poorer districts, a larger number of acres of grazing is allowed for each animal than on the lower and richer farms, and while this undoubtedly to some extent equalises the yield of cows under circumstances widely different, where comparisons are made between farm and farm the position of each should be fully taken into account.

With the exception of two or three cows, marked in the tables, the whole of the cows in the test were of the Ayrshire breed. The total number of cows under observation was 1342, distributed as follows: Fenwick district 11; Ayrshire district 320; Dumfriesshire 363; Wigtownshire 648 cows. Where, as in this case, the milk records have been kept for only six months, and where practically all the cows in each herd were reported on, it is not possible to compare the yield of every cow with that of its neighbour, unless where the cows have calved within a limited period. The first visit made by the recorders to the farms on their rounds extended from 4th to 18th May, so that the beginning of the testing may be looked on as 11th May, which is about the usual date when cows are put out to grass in Ayrshire.

For the purpose of comparing the various cows with each

other, and comparing cows of different ages and of different sizes, the period extending from 1st March to 31st May was taken as one likely to give fairly reliable results for all cows which had calved during that time. All the tables relating to the produce of cows of different ages and sizes deal only with those which had calved in the above period. A few cows which calved after the test began, and before the end of the month, had additions made to their yield when the size and age tables were made up. In doing so, the rate of decline in milk production and increase in percentage of fat at the last visit were calculated from the rate of the previous month. This average was multiplied by the number of days necessary to make the test correspond with the others, and the product added to the actual yield, so as to get the yield for six months.

The sheets for each farm give the actual yield of milk and average percentage of fat in the milk found by the recorders, without making any allowance for date of calving or otherwise. All faulty cows, such as those which had aborted or had lost a teat, are excluded from the size and age tables.

Out of the total number of 1342 cows of which a record has been kept, 914 calved within the above period. This number is quite sufficient to give a fairly reliable estimate of the milking capacity of cows of the Ayrshire breed, and it is on that number that the 10 per cent tables are based.

Many of the cows which have given very large yields during the six months over which the records extend, had given a considerable yield before they began, and in many instances would add considerably to that by what they yielded after the records stopped. These, when added together, give a total yield far beyond what the Ayrshire is generally credited with. The best 10 cows reported on are given in table on p. 175, although some equally as good cows may be among those which have calved in autumn, and in consequence are not comparable with the others. It is interesting to note that none of the farms in this table are in the earliest or very best districts. Thornhill is not particularly high, but owing to the open porous nature of much of the land in the district it is fairly early, although later than farther down the Nith. On the other hand, Sanquhar is high, the land in the bottom of the valley being porous and the climate wet. The parish of Symington in Ayrshire is not very high nor yet very late, although much of the land is a rather poor clay.

A very surprising fact is, that 9 of the 10 best cows (the Fenwick cows excluded) were found on three farms, and that none of these farms are either the best or the highest-rented of those visited. My impression, from intimacy with breeders of Ayrshires all over the country, has always been that in select-

ing their stock or breeding animals they are guided much more by the appearance than by the milking capacity of the animals themselves, or of their parents or grandparents. While that is probably too often the case, it is not always so, as is indicated by the three herds in question. While the breeder of dairy stock keeps prominently in view the milking capacity not only of the

THE TEN BEST COWS.

TABLE OF THE TEN BEST COWS REPORTED ON.

Owner.	No or name of cow.	Total milk in galls	Average of fat.	Galls milk of 3 of fat.	Value of produce at 5d per gall	Age of cow.	Size of cow.	Date of last calving.
					£ s. d.			
Wm. Sloan, Shawsmuir, Thornhill.	27 ¹	731	4.02	980	20 8 4	4	M	March
James Moffat, Gateside, Sanquhar.	1 ²	639	4.47	952	19 16 8	7	L	May 14†
James Wylie, Whitehill, Sanquhar.	30 ³	635	3.90	905	18 17 1	..	M	" 10†
Wm. Sloan, Shawsmuir, Thornhill.	3	663	4.01	887	18 9 7	9	M	February
A. M. Stevenson, Jane-field, Symington.	33	623	4.13	859	17 17 11	12	M	April 15
James Moffat, Gateside, Sanquhar.	40	659	3.73	856	17 16 8	6	S	March 20
Wm. Sloan, Shawsmuir, Thornhill.	1	759	3.36	852	17 15 0	9	L	March
A. M. Stevenson, Jane-field, Symington.	24	666	3.78	840	17 10 0	6	L	April 21
James Moffat, Gateside, Sanquhar.	19	632	3.97	837	17 8 9	9	M	" 23
A. M. Stevenson, Jane-field, Symington.	10	591	4.24	837	17 8 9	5	L	" 9

Competition at Fenwick for best milking cows.

Six tests at intervals of 30 days.

Jane Young, Marchbank, Fenwick.	Beauty	799	3.72	992	20 13 4	8	...	April 26
John Douglas, Langtyke, Fenwick.	July	699	4.12	961	20 0 5	7	...	" 23

¹ M=Medium; L=Large; S=Small. † Has a fortnight's milk added to make up six months.

animals he breeds from, but also of their parents and grandparents, there is no reason why in doing so he should not also keep in view a good general appearance, ample capacity and good form in udder and teats, a soft, silky, close coat of hair on a thin skin, and a mild placid temper, combined with robust constitution.

¹ See fig. 18, p. 228.

² See fig. 19, p. 228.

³ See fig. 20, p. 229.

On the smaller farms especially, where the farmer or some member of the family is daily engaged in the work of milking, the heaviest milking cows are fairly well known in a rough way, but the combination of quantity and quality of milk can be ascertained only by some system of milk-testing. The present scheme of this Society seems to be the one which gives the greatest promise of success, for it has been more largely adopted than any other method hitherto suggested.

The three following tables, giving 10 per cent of the most and least profitable cows of each herd in each district, will well repay close perusal by the owners of these herds and dairy-farmers generally.

BEST AND WORST COWS IN EACH HERD.

TABLE giving the average yield, &c., of 10 per cent of the most and least profitable cows of each herd, during the first six months of the grazing season. The percentage is calculated from the number of cows which have calved between March 1 and May 31, and only those cows which have calved within that period are included.

AYRSHIRE.

Farm.	Cows in the herd	No. reported on.	Average age.	Average date of calving.	Total milk in galls	Average % of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	No. of cows of each size reported on.			
									Best.		Worst.	
								£ s. d.	S.	M.	L.	S. M. L.
Janehead	38	4	8.5	April 14	646	3.55	830	17 5 10	1	1	2	
"		4	5.75	March 29	427	3.25	468	9 12 11	...			1 1 2
Turnberry	40	3	7.7	April 4	621	3.62	792	16 10 0	0	3	0	
"		3	9.7	March 13	325	3.20	347	7 4 7				1 2 0
Orangetield	16	1	7.0	Feb. 20	571	4.09	778	16 4 2	0	0	1	
"		1	5.0	April 24	379	4.03	515	10 14 7				0 1 0
Sauchrie	24	2	5.0	March 30	600	3.87	774	18 2 6	1	1	0	
"		2	5.0	" 15	360	3.13	381	7 18 9				0 1 1
Knockdon	45	4	7.75	April 1	569	3.91	742	15 9 2	1	1	2	
"		4	3.75	March 26	377	3.48	438	9 2 6				1 3 0
M'Quittiston	20	2	10.5	" 22	603	3.54	711	14 16 3	1	1	0	
"		2	3.5	" 24	315	3.61	379	7 17 11				0 1 1
Lemessock	40	3	9.7	April 1	513	3.98	692	14 8 4	0	8	0	
"		3	7.7	March 25	345	3.47	400	8 6 8				1 1 1
Raithhill	31	2	5.5	April 14	541	3.88	691	14 7 11	0	0	2	
"		2	4.5	March 29	298	3.52	350	7 5 10				0 2 0
Whiteside	24	2	7.5	April 16	561	3.55	664	13 16 8	0	1	1	
"		2	10.5	March 12	360	3.91	469	9 15 5				1 1 0
Aitkenbrae	23	1	7.0	Oct. 1902, Sep. 12, '03	453	3.90	597	12 8 9	0	0	1	
"		1	7.0	March 18	297	3.99	296	6 3 4				0 1 0
Broadwood	23	2	5.0	" 20	444	3.82	566	11 15 10	1	1	0	
"		2	3.5	April 4	302	3.93	396	8 5 0				1 1 0
Totals	324	52	...	...	...	...	...	...	5	12	9	6 15 5
Average of best	...	...	7.4	...	568	3.84	728	15 3 4	...			...
Average of worst	...	...	6.0	...	353	3.47	408	8 10 0	...			...

* M = Medium size; L = Large; S = Small.

DUMFRIES.

Farm.	Cows in the herd.	No. re- ported on.	Average age.	Average date of calving.	Total milk in gall.	Average of fat.	Gall. milk of 8 of fat	Value of produce at 5d. per gall.	No. of cows of each size reported on.	
									Best.	Worst.
								£ s. d.	S. M. L.	S. M. L.
Shawsmuir .	33	2	6.5	March 1	697	4.02	933	19 8 9	0 2 0	...
" .	...	2	4.5	April 1	489	3.16	515	10 14 7	...	0 2 0
Gateside .	38	3	7.3	" 19	642	4.12	852	18 7 6	1 1 1	...
" .	...	3	3.7	" 3	304	3.66	372	7 15 0	...	1 1 1
Whitehill .	30	3	8.0	" 15	647	3.87	834	17 7 6	0 3 0	...
" .	...	3	4.3	March 4	293	3.92	383	7 19 7	...	1 2 0
Drum .	17	1	3.0	April 28	535	4.17	744	15 10 0	0 1 0	...
" .	...	1	4.0	March 1	348	3.66	425	8 17 1	...	0 1 0
Banks .	31	2	4.5	" 25	558	3.89	724	15 1 8	0 2 0	...
" .	...	2	5.0	April 30	441	3.40	486	10 2 6	...	1 1 0
West Roucan	47	3	7.3	March 25	552	3.81	713	14 17 1	0 2 1	...
" .	...	3	4.3	" 4	307	3.63	372	7 15 0	...	1 2 0
Tower .	32	3	6.3	May 9	581	3.55	712	14 16 8	0 2 1	...
" .	...	3	3.3	April 4	264	3.99	351	7 6 3	...	1 1 1
Boghead .	23	1	7.0	" 21	555	3.76	696	14 10 0	0 1 0	...
" .	...	1	3.0	March 1	270	4.25	388	7 19 7	...	1 0 0
Tinwaldshaws	45	3	7.7	April 1	555	3.68	688	14 4 7	0 2 1	...
" .	...	3	4.3	March 4	299	3.83	382	7 19 2	...	2 1 0
Croftjane .	23	2	8.0	" 15	487	4.02	653	13 12 1	0 2 0	...
" .	...	2	3.5	" 13	280	3.80	355	7 7 11	...	1 1 0
Muirside .	44	3	6.6	April 5	538	3.56	639	13 6 3	2 1 0	...
" .	...	3	6.0	March 25	302	3.69	372	7 15 0	...	1 1 1
Totals .	368	52	...	...	...	...	...	...	3 19 4	10 13 3
Avg. of best	...	...	6.9	...	581	3.86	748	15 11 8	...	...
Avg. of worst	...	...	4.3	...	327	3.59	393	8 3 9	...	...

WIGTOWNSHIRE.

Greyhill .	52	3	5.7	March 18	534	3.73	726	15 2 6	1 2 0	...
" .	...	3	7.3	" 9	311	3.37	346	7 4 2	...	3 0 0
Kildonan .	52	3	7.0	" 14	538	4.03	723	15 1 3	1 1 1	...
" .	...	3	3.0	April 17	316	3.19	336	7 0 0	...	0 3 0
Freugh .	61	3	5.3	March 22	554	3.69	681	14 3 9	1 2 0	...
" .	...	3	7.0	April 22	314	3.47	364	7 11 8	...	1 1 1
Challoch .	60	3	8.3	March 13	516	4.00	678	14 2 6	1 1 1	...
" .	...	3	6.7	" 9	335	3.74	418	8 14 2	...	1 2 0
Inchipark .	44	2	8.0	Jan. 20	500	3.94	657	13 13 9	0 1 1	...
" .	...	2	4.5	March 15	314	3.90	408	8 10 0	...	1 1 0
Kilhilt .	54	3	7.0	...	513	3.81	653	13 12 1	0 1 2	...
" .	...	3	4.3	...	271	4.13	373	7 15 5	...	1 2 0
Awkirk .	61	4	6.0	April 10	559	3.49	650	13 10 10	1 1 2	...
" .	...	4	7.0	March 15	342	3.21	366	7 12 6	...	3 1 0
Ardwell .	39	2	5.5	Feb. 18	420	4.16	624	13 0 0	0 2 0	...
" .	...	2	4.0	March 10	211	4.00	282	5 17 6	...	0 2 0
Colfin .	60	5	7.0	" 15	533	3.49	620	12 18 4	1 3 1	...
" .	...	5	7.0	" 18	298	3.10	308	6 8 4	...	1 4 0
Chlenry .	60	4	8.5	April 10	462	3.87	597	12 8 9	2 1 1	...
" .	...	4	11.0	March 9	349	3.36	392	8 1 4	...	3 1 0
Dunragit .	58	3	6.8	...	440	4.06	596	12 8 4	1 2 0	...
" .	...	3	9.0	...	320	3.00	316	6 11 8	...	1 1 1
Merslaugh .	52	3	5.3	...	394	4.14	543	11 6 3	0 3 0	...
" .	...	3	4.7	...	253	3.61	305	6 7 1	...	2 1 0
Totals .	653	76	...	...	...	...	...	...	9 20 9	17 19 2
Avg. of best	...	...	6.7	...	505	3.82	643	13 7 11	...	...
Avg. of worst	...	...	6.6	...	288	3.44	331	6 17 11	...	...

Most of the farms seem to have a certain number of cows which, to say the least of them, cannot be considered profitable. Where the proportion of very young cows is great, it can never be expected that the yield will be large; but when older animals are found to give a yield only equal to or less than a young cow after her first calf, they should be disposed of without delay.

The difference between 10 per cent of the most and least profitable cows is probably greater in money value than any of the owners had any idea of. In the most of cases the one is just about double that of the other. On many of the farms a large proportion of the 10 per cent of the least profitable lot are three-year-olds, and in these cases the lowness of the yield need not be wondered at. In many, however, the average age of both lots does not differ very materially, so that if these cows paid expenses—which I very much question—the others, consuming the same food and entailing the same expense, must have left a handsome profit. When 10 per cent of the most and least profitable cows of each district are grouped together, the position that each district holds is clearly indicated. See tables, p. 179.

In the most profitable lot Dumfries on the average is slightly better than Ayrshire, the gain being principally the result of the heavy-milking animals in the Shawsmuir and Gateside herds. For a dairying county Wigtownshire breeds a comparatively small number of its own cows, and it, as a consequence, comes in a long way behind the others in yield.

In the least profitable lot Ayrshire comes out best, Wigtownshire being again far behind. The difference between Ayrshire and Wigtownshire, even on the worst animals, almost equals the cost of the summer grazing of a cow in the latter district. In the breeding of heavy-milking cows there is, therefore, much greater chance of reducing the cost of the production of a gallon of milk, by careful and systematic selection of the animals, than in any other direction open at the present time. A profit of £7 or £8 on one cow over another during the year is a prize worth striving after, more especially as the one cow is supposed to cost exactly the same as the other for food, which is one of the heaviest items of expenditure.

Many people have the idea that heavy-milking cows invariably give very poor milk. As occasionally happens with cows of all kinds, one having very poor milk will crop up now and again among the heavy milkers. Judging from the 180 cows all calving about the one time in the 10 per cent most and least profitable lot (tables, p. 179), the heavy milkers have decidedly given the richest milk. Not only does this apply to one of the districts, but to all, for the quality on the average is very uniform in each. The least valuable cows have given milk with ·34 per cent less fat on the average than the others, whereas the

prevailing opinion seems to be that it would have been the other way. In none of the districts does the quality of milk of the least profitable cows come up to the lowest quality of the most profitable lot in any other district.

BEST AND WORST COWS IN EACH DISTRICT.

TABLE GIVING THE AVERAGE YIELD, &c., OF 10 PER CENT OF THE MOST PROFITABLE COWS OF EACH DISTRICT.

District.	Total cows in the district.	No. reported on.	Average age.	Average milk in galls.	Average % of fat.	Average galls. milk of 8 % of fat.	Value of produce at 5d. per gall.	No. of cows of each size reported on.		
							£ s. d.	S.	M.	L.
Dumfriesshire .	363	26	6.9	581	3.86	748	15 11 8	3	19	4
Ayrshire .	324	26	7.4	568	3.84	728	15 8 4	5	12	9
Wigtownshire .	653	38	6.7	505	3.82	643	13 7 11	9	20	9
Totals .	1340	90	...	545	3.84	698	14 10 10	17	51	22
Averages	...	...	...	...	...	...	...	...	...	...

TABLE GIVING THE AVERAGE YIELD, &c., OF 10 PER CENT OF THE LEAST PROFITABLE COWS OF EACH DISTRICT.

District.	Total cows in the district.	No. reported on.	Average age.	Average milk in galls.	Average % of fat.	Average galls. milk of 8 % of fat.	Value of produce at 5d. per gall.	No. of cows of each size reported on.		
							£ s. d.	S.	M.	L.
Ayrshire .	324	26	6.0	353	3.47	408	8 10 0	6	15	5
Dumfriesshire .	363	26	4.3	327	3.59	393	8 3 9	10	13	3
Wigtownshire .	653	38	6.6	283	3.44	331	6 17 11	17	19	2
Totals .	1340	90	...	318	3.50	371	7 14 7	33	47	10
Averages	...	...	...	...	...	...	...	..	..	..

The effect of Size in the Cows on their Yield of Milk.

The recorders in each district had instructions to go over all the cows under their charge along with the owners, and to mark each "small," "medium," or "large," according to its size. Any one can easily understand that the number of small, medium, and large cows will not be equal in number, but that the medium-sized animals will be more numerous than either the small ones or the large ones. In this estimate of the milk-yielding capabilities of the cows of different sizes, cows either two or three years old were not taken into account, as these, owing to their

age, would be classed smaller than they would be when full grown. Neither were the eleven cows entered for the special competition in the Fenwick District. On this account the total number of animals reported on is smaller than in the previous instance, being 742 cows.

YIELD AND QUALITY OF THE MILK OF 742 COWS OF THE VARIOUS DISTRICTS, ACCORDING TO SIZE, CALVING BETWEEN MARCH 1 AND MAY 31.

		Milk in galls.	Average of fat	Galls milk of 3 off fat	No of cows re- ported on.
Small cows.	Dumfriesshire	446	3.59	534	46
	Ayrshire	465	3.65	566	47
	Wigtownshire {	401	3.56	481	66
		370	3.63	448	44 ¹
	Average	420	3.62	507	203
Medium cows.	Dumfriesshire	529	3.62	642	161
	Ayrshire	444	3.76	557	91
	Wigtownshire {	405	3.60	487	99
		385	3.74	481	51 ¹
	Average	441	3.69	542	402
Large cows.	Dumfriesshire	522	3.53	615	21
	Ayrshire	475	3.74	592	61
	Wigtownshire {	444	3.34	493	40
		416	3.49	485	15 ¹
	Average	464	3.53	546	137

¹ In three of the herds in the Wigtownshire district the exact date of calving was not known, and these figures refer to these herds.

It is very probable that the owners and recorders in each district differed somewhat as to what in their opinion should be called a small cow, a medium one, or a large one; but, judging from the number of each class in each district compared with the whole, the variation in this respect seems to be very trifling.

It will be noticed that in Dumfriesshire, the animals classed as of medium size have given more milk than even the large ones, and that by a considerable number of gallons. On the other hand, in Ayrshire those classed as small cows have given more milk than the medium-sized ones, although on the average they are 26 gallons less than the large ones. In Wigtownshire there is a gradual rise in the yield from those of the smallest size to the large ones.

From the foregoing table it will be seen that there are more medium-sized cows than small ones and large ones combined. On some farms there were scarcely any large cows, and on others there were very few small ones.

In the six months, if the three districts are slumped together, the medium-sized cows have yielded 35 gallons of milk of 3 per cent of fat more than the small ones, while the large ones have only 4 gallons more than the medium-sized ones. These results are not at all in accord with the opinions held by many people, for the large cow is usually credited with yielding more milk than 4 gallons over a medium-sized one. The number of cows reported on is too small to render the figures very reliable, and we must wait until we have the experience of greater numbers before being very definite as to the results.

The large cows varied more in their yield than either the small or the medium-sized ones. When a large cow is a good milker, she has usually a very high yield, but an unusually large proportion of big cows are poor milkers. This probably has been brought about by calves being kept from the large and probably good-bodied cows, irrespective of their milking capacity. One can easily understand that had the milk record been carried on during winter, when large and small cows are stalled together, and where the one probably receives the same quantity of food as the other, the large cows might not have had an opportunity of doing their best. In the field this, however, could not be the case, so that we are forced to the conclusion that many of these animals did not inherit the capacity to produce a large milk-yield. It must also be kept in mind that the large animal requires more to keep up its body in proportion to its weight than the small one, and unless it eats a proportionately greater quantity of food, it must inevitably produce less milk.

It is probable that the medium-sized cows would, at calving, sell for £2 a-head more than the small ones, and the large ones at £2 over the medium-sized ones. Between the largest and the smallest cows there is only a difference in milk-yield during the six months of 39 gallons of milk of 3 per cent of fat, and the question will naturally occur to many a one, Is this quantity a sufficient return for an expenditure of £4 extra capital and for the cost of the extra food necessary to support the larger animal?

The yield of fat in the milk is less in the large cows than in those of either the medium or of small ones, and it will be interesting to see whether this is repeated in future years or not. At any rate, it is too early as yet to give any definite opinion on the matter; it must suffice here to state the figures and wait to see whether or not they are corroborated.

The effect of Age on Milk-yield.

This is probably the first opportunity which has ever occurred in Scotland where it was possible to give, even approximately, the average yield of Ayrshire cows of different ages. Advantage has therefore been taken of the information at our disposal to throw what light was available on this interesting question. For this purpose 903 animals which had calved after 1st March and before 31st May were selected and grouped together according to their ages, which varied from 2 to 18 years.

AVERAGE YIELD OF COWS OF DIFFERENT AGES CALVING BETWEEN MARCH 1 AND MAY 31, DURING THE FIRST SIX MONTHS OF THE GRAZING SEASON, IN AYRSHIRE, DUMFRIESHIRE, AND WIGTOWNSHIRE.

Age of cow, years.	Number of animals reported on	Average yield for six months in gallons	Average of fat in the milk	Average number of galls. milk of 3 of fat	Increase or decrease in galls. over the yield of the previous year.
2	30	362	3.83	462	...
3	147	377	3.87	479	17+
4	164	403	3.76	506	27+
5	137	421	3.66	515	9+
6	110	438	3.63	531	16+
7	88	465	3.63	563	32+
8	80	468	3.69	580	6+
9	50	461	3.63	559	10-
10	36	457	3.64	555	4-
11	28	464	3.60	556	1+
12	16	493	3.48	558	2+
13	10	428	3.42	487	71-
14	3	375	3.56	446	41-
15	3	406	3.39	459	13+
18	1	471	3.74	587	...
...	903	...	...	...	...

Average increase per year = 18 galls

From the foregoing table it will be seen that there is a fairly uniform and steady rise in the number of gallons of milk of 3 per cent of fat from 2 years up to 8 years; that from 9 years to 12 years there is practically speaking little fall, but that after that age there is a gradual decline. The difference between the two-year-olds and the eight-year-olds is 107 gallons for the six months, or an average per year of age of nearly 18 gallons for that period. The number of animals reported on up to 8 or 9 years old is likely to be sufficient to neutralise the fluctuations which happen in cows of all ages, and the averages obtained may therefore be looked on as approximately correct. For the

ages after 9 years the number of animals available is too limited to be relied upon, but they are given for what they are worth, and when added to others which may be available in future years, should assist in giving definite information on this point. The information now available seems to indicate that the age at which a cow attains her maximum yield, quantity and quality combined, is greater than it has hitherto been popularly supposed to be. The decrease from 9 years to 12 years seems also less than the majority of people expected.

The effect of Age on the Percentage of Fat in the Milk.

The table previously referred to, giving the yield of the animals according to age, indicates that at 3 years old cows yield milk of a slightly higher quality than at any other age. This has always been the popular belief, and on the whole it seems to be correct. The difference in the percentage of fat in the milk of a three-year-old and that of an eight-year-old does not seem to be nearly so great as popular opinion credits it with. The decrease in the percentage of fat after the age of 3 years seems quite pronounced and fairly uniform, but it is so trifling in amount that for practical purposes it is scarcely worth taking into account by the ordinary dairyman, if the cow is otherwise healthy and a good milker.

The Fat in the Milk of the Morning compared with that in the Evening Milk.

During the progress of the milk-record scheme a small portion of milk was taken from that yielded by each cow and put into a particular vessel. This sample of the mixed milk of every cow in each herd was tested for butter-fat both morning and evening, and, as is shown in the following table, the difference between them is trifling and almost within the limits of experimental error. The cows were generally milked at intervals of about twelve hours, and although there was some little deviation from this rule at busy periods during hay-time and harvest, it was never very great.

The sheet containing the results of the testing of the mixed milk of the morning and evening at the farm of Chlenry has gone amissing, having been either lost before the books were sent to me or in the accountant's office, as it was not with the others when they were returned to me. As will be seen from the table on p. 184, the Wigtownshire samples contained on an average part of the milk of 54 cows, and were taken 286 times. This is a number of cows and a number of samples sufficiently great to be quite reliable. As was to be expected, there is some

slight variation in the fat of the milk of the different herds, but on the whole these variations are very trifling. It seems to have been definitely proved that if milking is done at irregular intervals—say, eight or nine hours between the morning and evening milking, and fifteen or sixteen hours between that of the evening and morning—then the milk of the morning will contain a much smaller percentage of fat than the milk of the evening.

On the other hand, the above tests, which are the only ones which seem to have been made in this country on a large number of animals and extending over a lengthened period,

EVENING AND MORNING MILK.—WIGTOWNSHIRE.

COMPARISON OF THE MORNING AND EVENING MILK FROM THE FOLLOWING FARMS FOR THE FIRST SIX MONTHS OF THE GRAZING SEASON. From an average of 54 cows 286 samples of mixed milk were taken.

Farms.	No. of cows	Morning % of fat.	Evening % of fat.
Dunragit . . .	58	3·85	4·00
Challoch . . .	60	3·83	3·92
Colfin . . .	60	3·82	3·82
Awkirk . . .	61	3·95	4·23
Freugh . . .	61	4·06	3·88
Greyhill . . .	52	3·82	3·86
Kildonan . . .	52	3·95	4·07
Inchpark . . .	44	3·77	3·83
Ardwell . . .	39	4·15	4·35
Chlenry . . .	(60)	Missing.	
Merslaugh . . .	52		3·83
Kilhilt . . .	54	4·01	4·01
Average . . .	54	3·91	3·98

clearly show that if the milking is done at equal periods little or no variation need be expected between the milk of the morning and evening other than what is caused by temporary disturbances. Excessive cold or wet nights in spring or autumn, or very warm days during summer, may so upset the animals as even to reverse the ordinary conditions, and to cause the morning milk to be the richest. This was repeatedly happening on every farm, and on one farm (Freugh) the morning milk on the average of six months is considerably richer—viz., 8 per cent of fat—than that of the evening. This is the only farm where this is the case over the average for the whole

period, and as the herd consisted of 61 cows, it is probable that the cause, if discovered at all, will be found to be some condition outside and altogether independent of the animals.

On two farms the percentage of fat in the mixed samples of the morning and evening milk was identical, but on all the others it was slightly richer in the evening than in the morning.

In Ayrshire seven of the smaller herds had each cow's milk separately tested both morning and evening, instead of the milk of the whole herd being mixed, as was the case on the larger farms. At the period of writing I have only been able to separate three months of these results, which are as follows:—

AYRSHIRE.

COMPARISON OF THE MORNING AND EVENING MILK FROM THE
FOLLOWING FARMS FOR THREE MONTHS.

Farms.	No. of cows.	Morning % of fat.	Evening % of fat.
Nauchrie . . .	24	3.39	3.40
Whiteside . . .	24	3.38	3.49
Orangefield . . .	16	3.55	3.77
M'Quittiston . . .	20	3.46	3.50
Broadwood . . .	23	3.30	3.60
Raithhill . . .	31	3.51	3.65
Aitkenbrae . . .	23	3.23	3.46
Average . . .	23	3.40	3.54

This table gives an equivalent of 84 samples of mixed milk from an average of 23 cows each time. Being taken at the time of the year when milk is usually at its lowest quality, the averages are naturally less than those of Wigtownshire. In the latter county there were included the milkings at the latter end of the lactation period, when 5 and even 5.5 per cent of fat in the milk was quite common, which of course very materially raises the average for the whole period.

In the Ayrshire district none of the herds had richer milk in the morning than in the evening, nor yet was there any of them where it was equal. In all it was a little richer in the evening than in the morning, one farm being richer by as much as .3 per cent of fat, and other two .2 per cent. The average difference for the first three months of the year is exactly double that which was experienced in the Wigtownshire for the whole six months.

FENWICK DISTRICT.

Month	Average number of cows.	Per cent of butter-fat.	
		Morning	Evening.
May	11	3.52	3.54
June	11	3.89	3.77
July	11	3.9	3.8
August	11	3.38	3.36
September	11	4.00	3.96
October	11	4.68	4.50
Average . . . . .	...	3.89	3.82

In this district 11 cows were tested on five farms for six months for a special prize offered by the Fenwick Agricultural Society. In this case the milk was weighed and tested once each month only. It is interesting to note that unless in the month of May, when the average milk of these 11 cows was slightly richer in fat in the evening than in the morning, all the rest of the summer it was slightly richer in the morning. These cows were constantly on the pasture day and night during the whole period of the trial, and were milked at exactly the same hour, both morning and evening.

The effect of efficient Milking on the Quantity and Quality of the Milk.

In one herd in Dumfriesshire where there were three milkers, the recorder noticed that all the cows milked by the farmer's wife, who was a good milker, gave milk of a fairly high average, whereas those milked by a hired girl, who was an indifferent milker, seemed all low in quality. On his next visit the lots were changed, and the results were quite the reverse, the cows milked by the farmer's wife, although a different lot from those she had milked on the previous visit, not only giving most milk but milk of a higher percentage of fat. After this the recorder kept a note of the cows milked by each person, and after a time it was found that, no matter what lot the farmer's wife had, these cows invariably gave more milk and more fat than those milked by the girl already referred to. On various occasions the farmer's wife stripped the cows which had been milked by the hired girl, but unless on rare occasions the quantity of milk which was found on these cows was comparatively speaking trifling, and when it was added to what was taken away at the usual milking, neither in quantity nor in quality

did the yield amount to what these cows gave when they were milked by the farmer's wife.

In Wigtownshire the recorder began by having all the cows of every herd stripped after milking, and the weight and percentage of fat in the strippings estimated. The weight and contents of the strippings were not taken for each individual cow, but all strippings were emptied into one vessel, which was weighed and sampled. Neither was the weight and contents of the after-milkings taken into account in stating the total yield of each herd, and to this extent the Wigtownshire herds are understated. What will strike an impartial observer is the

STRIPPINGS.—WIGTOWNSHIRE.

Per Cow per Day.

Farm.	lb.	Percentage fat	3, milk.
Dunragit . . .	1.6	8.05	4.29
Merslaugh . . .	.86	7.60	2.47
Kilhilt . . . .	.32	9.22	.98
Ardwell	1.6	7.5	4.0
Greyhill . . . .	.44	7.0	1.03
Kildonan . . . .	.73	8.04	1.95
Freugh	1.5	6.53	3.26
Inchpark . . . .	.01	8.16	2.47
Awkirk	1.8	7.01	4.2
Colfin	1.83	7.03	4.0
Chlenry	1.9	6.82	4.32
Challoch	1.0	7.2	2.4

great variation in the average weight of strippings yielded by the different herds. These clearly indicate that some of the herds were much more carefully milked than others. An average weight of .32 lb. per cow for the Kilhilt herd is exceptionally good, and, unless with special cows, is very difficult to improve on, even where the milkers are expert and the work is very carefully done.

Where both cows and milkers are average, the strippings should not in any case exceed an average of from $\frac{3}{4}$ lb. to 1 lb. per cow. When they amount to from $1\frac{1}{2}$ lb. to nearly 2 lb. per cow the owner may be certain that the milking is very slovenly done, and that he is probably losing more directly and indirectly than would do the entire milking. Milking is paid at a much lower rate in Wigtownshire than in almost any other of the Scotch dairying districts, and more careful milking might be secured by a little higher remuneration and more personal supervision.

When these strippings are converted into milk of 3 per cent of fat, they amount to nearly half a gallon of milk of that quality, which at 5d. per gallon would represent fully 2d. per cow per day for several of the farms. In addition to this direct loss, there is the indirect loss resulting from the effect of the indifferent milking on the milk-producing power of the cows. All owners of cows know only too well that nothing shrinks the milk-yield of cows to such an extent as leaving milk on the cow. Indeed, the loss from this cause may amount to a further very large sum.

The strippings from each herd are fairly uniform in quality, the herds where the milking was cleanest having the richest strippings. The rich quality of the strippings from even the herds which were most indifferently milked will surprise many people, and easily accounts for the good results obtained by an efficient milker compared with an indifferent one.

FENWICK DISTRICT.

Competition for the most profitable Milk Cow.

For several years the Fenwick Agricultural Society have given prizes for the cow giving the highest yield, quantity and quality combined, three months after calving. All animals entered for the competition were tested at the farm on an agreed on date. As already stated, application was made to this Society for a grant in aid of this work, which was acceded to on condition that the tests were made once a-month. The following table gives the yield of the competing animals for six months—one cow for each competitor:—

COMPETITION FOR THE MOST PROFITABLE COW. MILK WEIGHED AND TESTED AT THE FARM EVERY 30 DAYS.

Owner of the cow.	Total milk in lbs.	Galls milk of 3% of fat in 8 months	Average % of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Date of last calving.
					£ s. d.		
James Young, Marchbank .	7995	1132	3.72	992	20 13 4	8	April 26
John Douglas, Langdyke .	6997	1137	4.12	961	20 0 5	7	" 23
John Gemmill, Aitkenhead .	6862	1031	3.96	907	18 17 11	7	" 20
James Calderwood, Windyhill	7320	1062	3.67	896	13 13 4	13	" 19
John Gemmill, Aitkenhead .	7185	922	3.52	843	17 11 3	8	" 9
James Calderwood, Windyhill	5790	Yeld	3.24	626	13 0 10	5	" 12
James Dunlop, Gree .	4470	Yeld	3.46	516	10 15 0	6	" 9
James Young, Marchbank .	5880	Yeld	4.06	795	16 11 3	3	" 30
John Gemmill, Aitkenhead .	5342	753	3.58	638	13 5 10	3	" 7
John Douglas, Langdyke .	4185	Yeld	4.37	610	12 14 2	3	" 22
John Gemmill, Aitkenhead .	3945	618	4.23	556	11 11 8	3	" 19

THE COST FOR FOOD IN PRODUCING MILK DURING THE
GRAZING SEASON.

The recorders in each district were asked to find out from each farmer the number of acres of pasture which the herd had the full use of, the average rent paid for that land (the rent to be varied as the land was better or worse than the average of the farm), the total amount of meal, grain, cake, &c., given to the cows while on the pasture, and the area of tares, cabbages, or turnips consumed in autumn. By these means it was hoped to arrive approximately at the cost of production on the different farms. The table on p. 190 indicates that for each district.

The *average* yield of the cows on each farm is considerably influenced by three causes—viz., the number of autumn and winter calving cows in the herd, the milking capacity of the cows, and the amount of food available. Had the records been continued for a full year the first of these influences would have been eliminated, but as they were carried on only for six months the averages are misleading where there were many autumn calvers, or, as in Wigtownshire, where the bulk of the cows calve much earlier than in Ayrshire or Dumfriesshire.

When the figures were tabulated it was found that the cost of summer grazing a cow did not differ materially in the same district. In the poorer districts a larger area of cheaper land approached very closely to the smaller areas of the better and higher-rented class of lands. These details were, however, of too personal a nature for publication; only the averages of each district are therefore given.

Details are furnished for every farm, with the exception of one, and they distinctly indicate that the chief factor in cheapening production is high milk-yield. They also clearly indicate that no food is so cheap as pasture at average rents, as the lowest rate of costs in all the districts is on those farms which have had plenty of pasture, have good milk-yields, and have used nothing else till early autumn. That is a result I was scarcely prepared for, but, at least for last season, it is so pronounced that I do not think I would be justified in making no reference to it. Other seasons may, however, alter the situation.

It is also worthy of note that even in herds where the bulk of the cows have calved at the same time, and the rental of the land does not materially differ, the cost of food to produce a gallon of milk ranges from $\frac{1}{2}$ d. per gallon to 1½d. To this cost for food there has to be added the outlay necessary to keep the cow when yielding little or nothing, a sum for depreciation if old cows are kept, the cost of attendance, and interest on capital, before anything is allowed for profit.

COST OF FOOD.

IN SUMMER.

Average Yield of the Cows in each District, and Cost of Production for Food, while the Cows are in Milk and on the Grass.

County and farm.	Average yield in gall. per cow.	Average cost for grain, forage, crops, and con- centrated foods.	Average cost for food for producing 1 gall. of milk.		
<i>Ayrshire—</i>					
Janefield .	627	54s. 3d. per cow.	1'3d. per gall.		
Turnberry .	561				
Knockdon .	560				
Sauchrie .	548				
Orangetield .	536				
Whiteside .	527				
M'Quittiston .	523				
Lesnessock .	504				
Broadwood .	445				
Raithhill .	444	47s. 9d. per cow.	1'07d. per gall.		
Aitkenbrae .	416				
<i>Dumfriesshire—</i>					
Shawsmuir .	646				
Drum .	606				
Gateside .	598				
Whitehill .	578				
Banks .	522				
Croftjane .	515				
Tinwaldshaws	515				
West Roucan	512				
Tower .	497	42s. per cow.	1'1d. per gall.		
Muirside .	495				
Boghead .	444				
<i>Wigtownshire—</i>					
Greyhill .	493				
Kilhilt .	491				
Kildonan .	459				
Freugh .	488				
Challoch .	484				
Inchpark .	476				
Dunragit .	452				
Colfin .	447				
Chlenry .	417				
Awkirk .	409				
Ardwell .	397				
Meislaugh .	390				

HERD RECORDS.

AYRSHIRE.

ALEXANDER CROSS, KNOCKDON, AYR.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
Cows yielding over 600 galls. milk of 3% of fat.	3	5890	4.13	811	£ s. d. 16 17 11	11	L	March 23
	12	4697	4.69	735	15 16 3	3	M	April 21
	27	6128	3.51	717	14 18 9	6	L	March 23
	4	6048	3.51	707	14 14 7	11	S	" 20
	7	5701	3.64	692	14 8 4	10	L	" 25
	11	5491	3.70	678	14 2 6	7	M	" 28
	25	4277	4.58	653	13 12 1	3	S	May 1
	8	5796	3.37	651	13 11 3	6	L	April 23
	34	5057	3.73	629	13 2 1	5	M	May 1
	26	4452	4.19	622	12 19 2	4	S	April 16
	33	4623	3.98	613	12 15 5	4	M	" 9
	20	4889	3.71	604	12 11 8	4	M	" 20
	22	5152	3.49	601	12 10 5	5	S	" 22
Average of	13	5246	3.83	670	14 1 8	6.1		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	31	5649	3.17	593	12 9 2	7	L	March 17
	38	5893	3.65	595	12 7 11	4	M	April 10
	1	4350	4.05	588	12 5 0	7	M	March 13
	5	4228	4.14	584	12 3 4	5	L	" 30
	19	4882	3.56	580	12 1 8	4	S	April 27
	44	4364	3.94	573	11 18 9	3	L	June 18
	21	4599	3.72	570	11 17 6	3	M	April 9
	37	4852	3.44	560	11 13 4	4	M	" 8
	9	5047	3.32	559	11 12 11	6	L	" 16
	45	4452	3.74	555	11 11 3	5	M	June 17
	6	4168	3.97	552	11 10 0	6	M	March 8
	41	4203	3.85	540	11 5 0	6	M	May 11*
	43	4369	3.68	536	11 3 4	5	S	" 9
	23	4221	3.75	528	11 0 0	6	L	" 27
	10	4889	3.19	521	10 16 1	6	L	March 7
	24	4126	3.78	520	10 17 8	3	L	April 1
	16	4914	3.17	519	10 16 3	5	M	March †
	42	4525	3.39	512	10 13 4	4	S	May 13
	18	3899	3.92	510	10 12 6	3	M	April 8
	29	4130	3.67	506	10 10 10	5	L	" 26
Average of	20	4539	3.63	550	11 9 2	4.8		
Cows yielding under 500	36	3965	3.71	491	10 4 7	3	M	April 18
	35	3510	4.15	485	10 2 1	4	L	" 12†
	17	3668	3.83	463	9 15 0	3	M	" 11
	2	4098	3.42	463	9 15 0	8	M	March 6

* 23 weeks.

† Aborted.

ALEXANDER CROSS—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
galls. milk of 3% of fat.	40	3976	3.52	467	£ s. d. 9 14 7	6	M	May 11
	14	3444	4.05	465	9 13 9	3	L	April 7
	13	3787	3.67	463	9 12 11	3	S	" 18
	30	4126	3.33	458	9 10 10	4	M	March 27
	39	4004	3.34	446	9 5 10	3	M	April 22
	23	3414	3.80	437	9 2 1	4	M	March 15*
	32	3536	3.21	411	8 11 3	3	M	Feb. 26
	15	3507	3.51	410	8 10 10	4	S	March 10
Average of	12	3780	3.62	456	9 10 0	4		
Average of the whole herd	45	4523	3.68	560	11 13 4	4.96		

ANDREW KAY, SAUCHRIE, MAYBOLE.

Cows yielding over 600 galls. milk of 3% of fat.	23	6219	3.73	775	16 2 11	6	M	March 27
	18	5775	4.02	773	16 2 1	4	S	April 2
	3	6492	3.51	760	15 16 8	7	M	Feb. 20
	20	6496	3.43	741	15 8 9	4	M	March 29
	11	6209	3.56	738	15 7 6	8	M	" 14
7 cows=29.16% of the herd.	15	4651	3.94	610	12 14 2	3	M	" 30
	13	5418	3.34	605	12 12 1	4	M	" 28
Average of	7	5894	3.6	714	14 17 6	5.14		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	22	4903	3.51	573	11 18 9	8	M	Jan. 16
	6	4354	3.84	558	11 12 6	7	M	March 14
	2	6016	2.72	547	11 7 11	12	S	" 3
	7	4383	3.72	537	11 3 9	3	L	April 5
	14	5068	3.11	525	10 18 9	6	M	Feb. 15
8 cows=33.33% of the herd.	9	4333	3.61	522	10 17 6	5	S	April 21
	10	4847	3.23	517	10 15 5	7	M	March 12
	5	4266	3.60	512	10 13 4	6	M	" 15
Average of	8	4765	3.37	536	11 3 4	6.75		
Cows yielding under 500 galls. milk of 3% of fat.	8	4763	3.03	481	10 0 5	3	M	April 8
	19	3990	3.51	466	9 14 2	4	L	March 11
	12	4375	3.02	440	9 3 4	8	M	" 15
	17	3878	3.39	438	9 2 6	4	L	" 18
	21	3412	3.82	434	9 0 10	3	M	" 30
	16	3405	3.81	433	9 0 5	4	M	" 9
9 cows=37.5% of the herd.	24	3461	3.59	414	8 12 6	8	M	Jan. 16
	1	3535	3.30	388	8 1 8	4	L	March 17
	4	3657	3.07	374	7 15 10	6	M	" 14
Average of	9	3831	3.4	430	8 19 2	4.88		
Average of the whole herd	24	4744	3.45	540	11 8 4	5.58		

* Dry, September 9.

JAMES KENNEDY, BROADWOOD, TARBOLTON.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving
Cows yielding be- tween 500 and 600 galls. milk of 3 % of fat.	3	4287	4.08	532	12 2 6	6	S	March 20
	4	4602	3.58	550	11 9 2	4	M	" 20
	19	4074	4.01	545	11 7 1	4	S	April 1
	16	4196	3.80	532	11 1 8	5	S	March 24
	9	4371	3.64	530	11 0 10	5	S	April 21
7 cows = 30.4% of the herd.	11	4571	3.38	515	10 14 7	4	L	May 10
	10	4420	3.45	508	10 11 8	5	L	March 30
Average of .	7	4360	3.7	537	11 3 9	4.7		
Cows yielding under 500 galls. milk of 3 % of fat.	7	3764	3.94	495	10 6 3	7	S	May 22
	12	3684	3.91	478	9 19 2	3	L	March 3
	15	4427	3.24	478	9 19 2	5	M	" 22
	1	3405	4.13	469	9 15 5	4	M	" 31
	13	3188	4.05	431	8 19 7	3	M	" 1
	14	3741	3.46	431	8 19 7	10	S	" 27
	2	3818	3.33	424	8 16 8	6	M	" 19
	5	3997	3.18	424	8 16 8	5	M	" 21
	6	3479	3.64	422	8 15 10	3	L	April 9
	17	3528	3.58	421	8 15 5	3	S	May 1
	18	2936	4.21	412	8 11 8	4	S	April 15
	3	3108	3.66	380	7 18 4	3	M	March 25*
	20	2475	4.02	332	6 18 4	2	S	July 1
	22	2464	3.85	316	6 11 8	2	S	" 2
	21	2313	3.82	294	6 2 6	2	S	" 2
	23	1517	4.65	235	4 17 11	2	S	" 12
Average of .	16	3239	3.7	403	8 7 11	4		
Average of the whole herd .	23	3580	3.7	445	9 5 5	4.2		

T. C. LINDSAY, AITKENBRAE, MONKTON.

Cows yielding be- tween 500 and 600 galls. milk of 3 % of fat.	13	4585	3.90	597	12 8 9	7	L	Oct. 1902
	6	5082	3.33	664	11 15 0	10	L	Sep. 10, '03
	14	4403	3.74	549	11 8 9	5	M	April 10
	15	4004	3.87	517	10 15 5	5	L	" 30
5 cows = 28.8 % of the herd.	12	4613	3.36	516	10 15 0	11	S	May 5
								Jan. 21
Average of .	5	4537	3.6	549	11 8 9	7.6		
Cows yielding under 500 galls. milk of 3 % of fat.	7	4133	3.55	490	10 4 2	4	S	June 13
	4	3927	3.72	487	10 2 11	5	L	Oct. 1902
	20	4123	3.50	432	10 0 10	3	M	April 14
	16	3902	3.58	466	9 14 2	3	M	May 1
	23	3815	3.09	457	9 10 5	6	S	Dec. 1 '03†
	17	4112	3.29	451	9 7 11	3	M	April 6
	22	3542	3.37	399	8 6 3	3	M	" 5
16 cows = 76.2% of the herd.	8	3381	3.33	369	7 13 9	6	S	March 4†
	21	3255	3.29	357	7 8 9	3	M	April 12

* Dry, October 16.

† Ill on first visit; dry, August 2.

‡ Ill on first visit.

T. C. LINDSAY—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	10	2674	3.81	340	£ s. d. 7 1 8	6	L	Sep. 29, '02*
	18	2695	3.47	312	6 10 0	3	M	April 13
	1	3258	2.83	307	6 7 11	8	L	Feb. 11†
	5	2646	3.43	303	6 6 3	5	L	Jan. 1
	2	2968	2.99	296	6 3 4	7	M	March 18
	11	2562	3.21	275	5 14 7	9	M	Feb. 14
	3	1781	3.66	214	4 9 2	7	M	Oct. 20, '02‡
Average of	16	3293	3.4	375	7 16 3	5.06		
Average of the whole herd	21	3593	3.47	416	8 13 4	5.66		

MRS MARSHALL, TURNBERRY, MAYBOLE.

	16	6639	3.55	786	16 7 6	7	M	March 21
	25	6318	3.61	786	16 7 6	7	M	May 11
	9	5470	4.25	776	16 3 4	9	M	March 13
	14	6226	3.64	755	15 14 7	4	S	April 1
	32	5866	3.72	728	15 3 4	10	L	March 4
Cows yielding over 600 galls. milk of 3% of fat.	11	5663	3.34	728	15 2 6	8	M	" 7
	12	6055	3.57	722	15 0 10	6	L	May 20
	27	5754	3.67	704	14 13 6	10	L	April 4
	31	5957	3.42	679	14 2 11	7	S	March 11
	24	4977	3.66	640	13 6 6	3	L	April 12
18 cows=46.15% of the herd.	5	5631	3.83	634	13 4 2	8	S	March 19
	39	5315	3.57	634	13 4 2	10	S	May 27
	29	6349	3.00	633	13 3 9	5	S	March 28
	40	4640	4.08	632	13 3 4	5	M	June 12
	35	5296	3.54	625	13 0 5	5	M	May 23
	38	5376	3.18	624	13 0 0	10	L	March 29
	7	5491	3.39	621	12 18 9	8	L	April 12
	22	4179	4.30	600	12 10 0	7	S	March 23
Average of	18	5622	3.67	659	11 7 1	7.2		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	37	4497	3.92	588	12 5 0	6	M	April 3
	34	4987	3.51	593	12 2 11	7	S	March 8
	4	4641	3.55	540	11 8 9	6	M	" 5
	3	4476	3.59	536	11 3 4	5	S	" 20
	8	4340	3.62	524	10 18 4	6	L	" 23
8 cows=20.5% of the herd.	17	4014	3.75	501	10 8 9	4	M	April
	19	3545	4.24	501	10 8 9	3	L	Dec. 5, '02
	23	4018	3.73	500	10 8 4	3	L	March 1
Average of	8	4314	3.72	535	11 2 11	5		
Cows yielding under 500 galls. milk of 3% of fat.	27	3009	3.77	492	10 5 0	10	S	March 7
	15	3079	3.69	490	10 4 2	4	M	Dec. 5, '02
	18	3227	4.53	488	10 3 4	5	M	Jan. 14
	36	3825	3.70	472	9 16 8	4	L	Feb. 21
	1	3244	3.46	429	8 18 9	6	L	Jan. 26§
13 cows=33.3% of the herd.	21	3161	3.41	412	8 11 8	3	M	March 21
	6	3647	3.31	402	8 7 6	11	M	" 5

* Dry, September 5

† Dry, October 17.

‡ Dry, August 8.

§ Dry, September 22.

Mrs MARSHALL—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	2	3118	3.72	387	£ s. d. 8 1 3	5	M	Jan. 31
	28	2831	3.92	370	7 14 2	3	L	" 31
	33	3104	3.52	365	7 12 1	5	M	June '02
	10	3454	3.03	355	7 7 11	7	M	March 14
	30	2656	3.22	285	5 18 9	11	S	" 19
	26	1928	3.67	236	4 18 4	5	L	Aug. 1902†
Average of	13	3237	3.69	399	8 6 3	6.1		
Average of the whole herd	39	4553	3.69	561	11 13 9	6.6		

ROBERT MONTGOMERY, LESNESSOCK, OCHILTREE.

Cows yielding over 400 galls milk of 3% of fat.	16	5526	4.09	753	15 13 9	10	M	April
	20	5239	3.85	674	14 0 10	11	M	"
	30	4896	4.00	650	13 10 10	8	M	March
5 cows=12.5% of the herd	9	5820	3.31	643	13 7 11	6	M	"
	19	4476	4.02	600	12 10 0	10	L	April
Average of	5	5149	3.8	664	13 16 8	9		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	17	4672	3.51	503	12 7 1	7	L	March
	31	4613	3.55	577	12 0 5	5	L	April
	38	4109	4.20	575	11 19 7	5	M	March
	27	4595	3.70	567	11 16 3	8	L	"
	22	5028	3.37	565	11 15 5	9	M	April
	26	4938	3.87	554	11 10 10	8	M	March
	23	4438	3.73	552	11 10 0	10	M	"
	11	4854	3.86	543	11 6 3	12	S	"
	33	4364	3.76	538	11 4 2	6	S	"
15 cows=37.5% of the herd.	3	3867	4.09	523	11 0 0	3	S	April
	13	3850	4.02	516	10 15 0	5	M	March
	35	4109	3.73	512	10 13 4	5	M	"
	36	3591	4.28	510	10 12 6	6	L	"
	15	3920	3.83	508	10 11 8	8	M	"
	32	4686	3.24	506	10 10 10	6	L	April
Average of	15	4375	3.7	543	11 6 3	6.36		
Cows yielding under 500 galls. milk of 3% of fat.	8	3507	4.25	498	10 7 6	4	M	March
	7	3524	4.21	494	10 5 10	4	M	"
	21	4637	3.19	493	10 5 5	7	M	April
	4	3755	3.94	492	10 5 0	3	M	March
	10	3564	4.03	482	10 0 10	6	M	April
	39	3713	3.78	469	9 15 5	6	M	"
Cows yielding under 500 galls. milk of 3% of fat.	28	3727	3.74	465	9 13 9	4	M	March
	13	3906	3.55	463	9 12 11	13	L	April
	25	4179	3.27	458	9 10 10	7	L	"
	29	3218	4.05	440	9 3 4	6	L	March ‡
	37	3307	3.98	430	9 2 11	4	M	April
20 cows=50% of the herd.	21	3269	4.00	427	9 2 1	3	M	"
	12	3087	4.20	423	9 0 5	4	M	March
	5	3615	3.56	420	8 18 9	3	M	Feb.

‡ Dry, September 22.

† Dry, August 11.

‡ Only three teats.

ROBERT MONTGOMERY—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	2	2966	4.23	423	8 16 3	3	s	Feb.
	34	3437	3.66	416	8 13 4	5	M	March*
	10	3626	3.33	403	8 7 11	6	L	"
	14	3647	3.00	364	7 11 8	14	s	April
	6	2362	4.12	324	6 15 0	3	M	March†
	1	2548	3.12	265	5 10 5	3	s	Feb.
Average of .	20	3482	3.7	434	9 0 10	5.4		
Average of the whole herd .	40	4030	3.71	504	10 10 0	6.4		

JAMES SELLARS, ORANGEFIELD, MONKTON.

Cows yielding over 600 galls. milk of 3 % of fat.	4	5708	4.04	778	16 4 2	7	L	Feb. 20
	10	5796	3.97	771	16 1 3	7	M	" 24
	3	5036	4.09	638	14 6 8	4	L	March 1†
	8	4959	4.06	671	13 19 7	4	M	" 29
6 cows=37.5 of the herd	6	5953	3.19	633	13 3 9	7	L	Feb. 12
	7	4606	3.93	604	12 11 8	3	M	April 29
Average of .	6	5343	3.88	691	14 7 11	5.33		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	11	4116	4.16	571	11 17 11	3	s	March 1†
	14	3752	4.30	539	11 4 7	3	L	April 27
	1	3860	4.01	516	10 15 0	6	M	March 6
4 cows=25 % of the herd.	9	3787	4.08	515	10 14 7	5	M	April 24
Average of .	4	3879	4.13	535	11 2 11	4.25		
Cows yielding under 500 galls. milk of 3 % of fat.	5	4350	3.40	494	10 5 10	10	s	June 22
	12	3671	3.79	465	9 13 9	3	L	Feb. 24
	2	3593	3.60	432	9 0 0	10	M	" 5
	13	3125	3.84	400	8 6 8	3	L	Nv. 15, '02§
	15	2821	4.05	354	7 7 6	3	M	" 11, '02
6 cows=37.5 of the herd.	16	1428	3.10	148	3 1 8	3	M	March 8||
Average of .	6	3132	3.65	382	7 19 2	5.33		
Average of the whole herd .	16	4148	3.86	536	11 3 4	5.06		

MESSRS R. & H. SELLARS, WHITESIDE, MONKTON.

Cows yielding over 600 galls. milk of 3 % of fat.	17	5635	3.63	692	14 8 4	10	M	April 6
	11	5586	3.42	637	13 5 5	5	L	" 27
	10	5134	3.67	629	13 2 1	8	L	March 26
4 cows=16 % of the herd.	3	4840	3.81	616	12 16 8	11	s	April 25
Average of .	4	5299	3.6	643	13 7 11	8.5		

* Ill after September 15.

§ Ill at first visit; aborted.

† Only three teats.

|| Ill first visit; dry, August 17.

‡ Aborted

Messrs R. & H. SELLARS—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	4	5026	3.42	573	£ s. d. 11 19 9	12	M	March 6
	19	4793	3.57	570	11 17 6	9	L	May 26
Cows yielding between 500 and 600 galls. milk of 3% of fat.	20	5026	3.40	570	11 17 6	8	L	March 14
	7	4991	3.40	566	11 15 10	10	S	" 17
	1	4515	3.67	553	11 10 5	6	L	" 9*
	15	4868	3.38	548	11 8 4	5	M	" 9
	9	4291	3.79	542	11 5 10	5	L	" 28
	14	4483	3.59	536	11 3 4	9	S	Feb. 26
18 cows=54.16 % of the herd.	6	3920	4.06	531	11 1 3	3	M	March 12
	8	4210	3.68	517	10 15 5	9	M	" 17
	18	4382	3.51	513	10 13 9	7	M	April 12
	21	3990	3.81	507	10 11 3	9	M	March 8
	22	3857	3.91	503	10 9 7	3	L	Oct. 29, '02
Average of .	13	4489	3.6	541	11 5 5	7.3		
Cows yielding under 500 galls. milk of 3% of fat.	16	4424	3.34	493	10 5 5	4	S	March 20†
	5	3423	4.23	433	10 1 3	4	M	Feb. 9
	2	3762	3.65	458	9 10 10	4	S	" 28
	23	3332	3.96	440	9 3 4	2	M	May 21
	13	3206	4.03	431	8 19 7	12	S	March 15
7 cows=29.16 % of the herd.	24	3269	3.55	387	8 1 3	2	M	May 22
	12	3206	3.28	350	7 5 10	5	L	Dec. 30, '02†
Average of .	7	3517	3.7	435	9 1 3	4.7		
Average of the whole herd .	24	4340	3.61	527	10 19 7	6.7		

ALEX. SPEIRS, RAITHILL, COYLTON.

Cows yielding over 600 galls. milk of 3% of fat.	18	5160	4.04	695	14 9 7	5	L	May 20
	9	5460	3.63	661	13 15 5	6	L	April 10
3 cows=10% of the herd	4	4704	3.86	605	12 12 1	8	L	March 2
Average of .	3	5108	3.8	654	13 12 6	6.3		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	3	4419	3.82	567	11 16 3	7	S	April 3
	25	3972	4.07	540	11 5 0	5	S	March 1
	15	4606	3.56	537	11 3 9	11	L	Feb. 27
	8	3860	4.08	520	10 16 8	6	M	March 4
	13	4074	3.88	520	10 16 8	5	M	Feb. 25
7 cows=23.3 % of the herd.	6	4357	3.53	513	10 13 9	4	M	April 7
	2	3822	4.02	512	10 13 4	8	M	March 26
Average of .	7	4163	3.8	530	11 0 10	6.57		
	10	3535	4.11	484	10 1 8	4	M	May 14
	23	4441	3.26	482	10 0 10	11	M	Feb. 25
	28	3773	4.14	466	9 14 2	4	M	May 11
Cows yielding under 500	26	3892	3.48	452	9 8 4	4	M	" 8
	12	3521	3.77	443	9 4 7	6	L	Feb. 15

* Ill first visit.

† Dry, October 9.

‡ Dry, September 25.

ALEX. SPEIRS—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
galls. milk of 3% of fat.	31	2660	4.98	442	£ 8 4 2	5	M	June 18
	21	3405	3.85	437	9 2 1	5	M	Feb. 28
	17	2954	4.38	429	8 18 9	3	L	June 18
20 cows = 66.6% of the herd.	7	3385	3.79	422	8 15 10	4	M	March 9
	24	2999	3.99	398	8 5 10	5	M	Feb. 10
	27	3139	3.58	375	7 16 3	4	L	March 4
	14	2975	3.76	370	7 14 2	6	M	Feb. 10 ^r
	30	2119	5.03	358	7 8 4	3	L	June 20
	1	2541	4.18	351	7 7 6	3	S	April 18
	22	2884	3.65	351	7 6 3	5	M	March 15 ⁺
	5	3083	3.39	349	7 5 5	1	M	April 12
	29	2674	3.86	345	7 3 9	5	S	June 5
	20	2832	4.06	313	6 12 6	1	M	Feb. 26 ⁺
	11	1991	3.18	200	1 7 1	7	S	Jan. 11 [§]
	19	1557	3.59	186	3 17 6	5	L	Dec. 28, '02
Average of	20	2891	3.8	383	7 19 7	4.85		
Average of the whole herd	30	3476	3.8	444	9 5 0	5.4		

ROBERT STEELE, McQUITTISTON, DRONGAN.

Cows yielding over 500 galls. milk of 3% of fat.	11	6566	3.39	742	15 9 2	11	S	March 17
	17	5488	3.72	680	11 3 4	10	M	" 27
1 cows = 20% of the herd	8	4900	4.02	657	13 13 9	9	L	" 9
	5	5652	3.29	620	12 18 4	13	M	May 1
Average of	4	5651	3.58	675	14 1 3	10.7		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	4	4707	3.75	589	12 5 5	18	L	Feb. 17
	16	4287	4.09	585	12 3 9	8	L	" 23
	10	5078	3.14	583	12 2 11	11	S	March 12
	3	4611	3.69	571	11 17 11	4	M	" 19
	18	4315	3.92	565	11 15 5	4	L	April 27
	15	4648	3.59	553	11 10 5	12	L	March 8
9 cows = 40% of the herd.	9	4735	3.42	541	11 5 5	8	S	Feb. 25 [¶]
	19	4364	3.57	520	10 16 8	1	L	March 17
Average of	8	4597	3.67	563	11 14 7	8.92		
Cows yielding under 500 galls. milk of 3% of fat.	6	3549	3.97	470	9 15 10	6	L	Feb. 14 [¶]
	2	3633	3.83	463	9 12 11	5	M	March 9 [¶]
	7	3598	3.71	446	9 5 10	4	L	" 8
	14	3475	3.59	416	8 13 4	5	L	" 17
	1	3535	3.50	413	8 12 1	4	M	April 14 [¶]
9 cows = 40% of the herd.	20	3075	3.50	390	8 2 6	2	S	July 1
	13	2768	3.74	345	7 3 9	3	L	Mar. 14 [¶]
	12	2537	3.78	318	6 12 6	2	M	June 26
Average of	9	3271	3.74	408	8 10 0	3.87		
Average of the whole herd	20	4277	3.68	523	10 17 11	7.11		

Dry, October 2
 & Dry, August 2.

† Dry, October 3
 † Dry, August 7

† Dry, September 17
 † Dry, October 14.

A. M. STEVENSON, JANEFIELD SYMINGTON.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
					£ s. d.			
	33	6283	4.13	859	17 17 11	12	M	April 15
	24	6664	3.78	840	17 10 0	6	L	" 24
	10	5915	4.24	837	17 8 9	5	L	" 9
	18	7021	3.36	786	16 7 6	11	S	" 9
	4	5743	4.02	771	16 1 3	5	L	May 2
	30	5432	4.05	735	15 6 3	10	M	" 3
	34	5176	4.23	729	15 3 9	3	M	April 12
	19	5575	3.75	697	14 10 5	10	L	" 13
Cows yielding	16	5197	3.98	690	14 7 6	3	M	" 10
over 600 galls.	14	4588	4.42	676	14 1 8	7	S	May 16
milk of 3% of	20	6030	3.27	657	13 13 9	8	M	April 16
fat.	28	5898	3.36	654	13 12 6	8	L	March 12
	6	5491	3.57	653	13 12 1	10	M	April 3
23 cows=60.5 %	11	5537	3.51	648	13 10 0	7	L	" 2
of the herd.	7	5575	3.45	641	13 7 1	3	M	" 20
	12	4900	3.89	636	13 5 0	4	L	" 2
	8	5078	3.73	631	13 2 11	3	M	" 11
	32	5768	3.27	628	13 1 8	13	S	March 7
	15	4770	3.91	622	12 19 2	9	S	May 12
	35	5355	3.47	620	12 18 4	3	S	April 15
	17	4949	3.63	608	12 13 4	11	S	March 27
	9	4627	3.94	607	12 12 11	5	L	Feb. 27
	26	5169	3.49	601	12 10 5	6	M	March 23
Average of	23	5506	3.7	638	14 6 8	7		
Cows yielding	29	4837	3.66	591	12 6 3	3	L	March 29
between 500	1	4462	3.97	590	12 5 10	12	M	May 15
and 600 galls.	23	4798	3.69	590	12 5 10	8	M	March 5
milk of 3% of	25	5145	3.41	584	12 3 4	6	M	" 17
fat.	21	4504	3.81	572	11 18 4	5	L	April 6
	22	4693	3.62	567	11 16 3	7	M	" 20
	27	4113	3.83	564	11 15 0	6	L	" 10
10 cows=26.3 %	13	4266	3.87	551	11 9 7	10	M	March 6
of the herd.	38	4919	3.35	550	11 9 2	4	L	May 27
	36	4077	3.73	508	10 11 8	3	M	March 23
Average of	10	4611	3.7	567	11 16 3	6.4		
Cows yielding	5	4637	3.09	477	9 18 9	3	M	April 28
under 500 galls.	3	1574	3.11	475	9 17 11	8	L	March 14
milk of 3 % of	31	4322	3.26	470	9 15 10	7	S	April 9
fat.	37	3377	4.16	468	9 15 0	2	M	May 23
5 cows=13.1 %	2	3545	3.65	432	9 0 0	5	L	March 4
of the herd								
Average of	5	4091	3.4	464	9 13 4	5		
Average of the	38	5084	3.66	627	13 1 3	6.57		
whole herd								

DUMFRIES.

ALEX. ALLAN, CROFTJANE, THORNHILL.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
Cows yielding over 500 galls. milk of 3% of fat.	1	5513	3.59	661	£ s. d. 13 15 5	8	M	March 27
	22	4228	4.57	645	13 8 9	8	M	" 3
3 cows=13 % of the herd.	11	5226	3.59	627	13 1 3	5	M	April 8
Average of .	3	4959	3.88	644	13 8 4	7		
	6	4876	3.72	593	12 2 11	9	M	March 22
	12	4760	3.61	574	11 19 2	5	M	April 12
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	4	4574	3.71	566	11 15 10	9	M	" 17
	21	4120	4.09	563	11 14 7	5	M	March 18
	16	4512	3.67	552	11 10 0	3	M	April 2
	23	4399	3.74	549	11 8 9	6	M	March 23
	7	4284	3.75	536	11 3 4	4	S	May 15
	10	4230	3.75	531	11 1 3	7	S	March 16
12 cows=52.2 % of the herd.	17	3863	4.06	527	10 19 7	4	M	" 16
	2	4644	3.40	527	10 19 7	11	M	April 10
	3	3930	3.93	515	10 14 7	5	S	March 7
	20	3615	4.22	508	10 11 8	3	...	" 28
Average of .	12	4300	3.80	545	11 7 1	5.8		
Cows yielding under 500 galls. milk of 3 % of fat.	19	3846	3.78	486	10 2 6	3	...	March 17
	18	3593	3.98	478	9 19 2	4	M	" 18
	14	3331	4.18	471	9 16 3	3	...	" 10
	8	3472	3.64	422	8 15 10	3	...	" 19
	9	3616	3.43	413	8 12 1	6	S	April 3
8 cows=34.8 % of the herd.	5	2995	4.02	401	8 7 1	3	...	March 23
	15	2965	3.82	379	7 17 6	4	M	" 14
	13	2631	3.90	333	6 18 9	3	...	" 12
Average of .	9	3312	3.83	423	8 16 3	7.6		
Average of the herd . . .	23	4046	3.82	515	10 14 7			

THOMAS BROWN, DRUM, THORNHILL.

Cows yielding over 600 galls. milk of 3 % of fat.	6	5347	4.17	744	15 10 0	3	..	April 28
	3	5472	3.81	695	14 9 7	8	L	" 23
	18	5905	3.47	684	14 5 0	6	M	" 11
	12	5664	3.60	680	14 3 4	7	M	" 13
	21	5923	3.40	676	14 1 8	10	M	June 13
	4	4984	3.98	662	13 15 10	8	M	Feb. 16
10 cows=53.8 % of the herd.	16	5005	3.35	559	13 14 7	5	M	June 12
	1	5068	3.86	653	13 12 1	9	L	April 1
	9	5194	3.73	647	13 9 7	7	M	March 7
	15	4963	3.90	643	13 7 11	4	M	April 19
Average of .	10	5352	3.72	664	13 16 8	6.7		

THOMAS BROWN—*continued.*

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
Cows yielding between 500 and 600 galls. milk of 3% of fat.	17	5117	3.47	593	£ s. d. 12 7 1	6	M	May 24
	5	4883	3.63	591	12 6 3	3	...	" 10
	8	4634	3.82	590	12 5 10	9	M	Jan. 4
4 cows=23.5% of the herd.	10	4008	4.00	536	11 3 4	6	M	March 30
Average of .	4	4660	3.72	577	12 0 5	6		
Cows yielding under 500 galls. milk of 3% of fat.	7	3474	4.23	490	10 4 2	6	M	April
	14	3101	4.21	435	9 1 3	4	M	March 20
3 cows=17.7% of the herd.	13	3486	3.66	425	8 17 1	4	M	" 1
Average of .	3	3354	4.12	447	9 6 3	4.7		
Average of the whole herd .	17	4837	3.76	606	12 12 6			

MESSRS DICKIE, TOWER, SANQUHAR.

Cows yielding over 600 galls. milk of 3% of fat.	8	5597	3.69	690	14 7 6	4	M	April
	29	5978	3.43	683	14 4 7	6	M	May 12
	31	5674	3.54	671	13 19 7	9	L	" 30
	22	5465	3.67	669	13 18 9	4	M	April
6 cows=18.7% of the herd.	30	4928	3.79	623	12 19 7	5	S	June 16
	7	5002	3.70	618	12 17 6	4	S	May
Average of .	6	5440	3.63	659	13 15 0	5.4		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	3	4816	3.57	573	11 18 9	4	S	April
	25	4561	3.75	570	11 17 6	3	...	"
	26	4022	4.21	565	11 15 5	4	M	March
	11	4529	3.71	560	11 13 4	8	M	April
	16	4959	3.35	555	11 11 3	6	M	March
	28	4380	3.64	532	11 1 8	7	S	May 15
	9	3543	4.50	531	11 0 3	3	...	Feb.
11 cows=34.4% of the herd.	24	4011	3.92	525	10 18 9	3	...	April
	4	4445	3.45	511	10 12 11	4	L	March
	17	3920	3.86	509	10 11 8	9	M	Feb.
	33	4253	3.53	500	10 8 4	6	L	June
Average of .	11	4133	3.72	539	11 4 7	5.2		
Cows yielding under 500 galls. milk of 3% of fat.	13	3829	3.80	485	10 2 1	3	...	April
	15	4026	3.52	472	9 16 8	5	M	March 16
	19	3994	3.52	470	9 15 10	4	M	"
	27	3721	3.71	460	9 11 8	3	...	April
	21	3395	4.06	460	9 11 8	5	M	Jan.
	5	4162	3.25	451	9 7 11	4	L	March
	10	3882	3.25	420	8 15 0	4	M	April 1
	2	3839	3.14	403	8 7 11	4	S	March
15 cows=34.4% of the herd.	12	3483	3.24	378	7 17 6	5	M	"
	6	3012	3.62	364	7 11 8	4	L	"

Messrs DICKIE—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	23	2828	3.76	351	£ 7 7 6	3	...	April
	32	3126	3.85	349	7 5 5	4	M	June
	14	2086	4.86	335	6 19 7	3	...	April
	20	2842	3.48	327	6 16 3	5	M	Feb.
	1	2685	3.42	306	6 7 6	4	...	Jan. 15
Average of .	15	3394	3.55	402	8 7 1	4		
Average of the whole herd .	32	1031	3.70	497	10 7 1			

JAMES MOFFAT, GATESIDE, SANQUHAR.

	1*	6097	4.47	910	18 19 2	7	L	May 11
	40	6594	3.73	856	17 16 8	6	S	March 20
	19	6321	3.97	837	17 8 9	9	M	April 23
	21	6036	3.57	793	16 10 5	9	M	" 17
	6	6307	3.76	791	16 9 7	12	M	" 15
Cows yielding over 600 galls. milk of 3% of fat.	7	6240	3.70	760	15 16 8	6	M	March 18
	11	5495	4.13	757	15 15 5	4	M	April 16
	10	6006	3.74	745	15 10 5	5	M	" 5
	3	5635	3.94	739	15 7 11	13	M	March 26
	31	6311	3.46	729	15 3 9	9	M	April 25
18 cows=47.3 % of the herd.	16	5633	3.69	700	14 11 8	7	M	" 25
	20	5525	3.71	684	14 5 0	5	M	" 20
	28	5516	3.55	653	13 12 1	6	M	" 7
	32	6156	3.12	642	13 7 6	8	M	March 1
	22	5671	3.39	641	13 7 1	6	M	April 25
	35	4960	3.78	625	13 0 5	8	M	" 15
	17	4832	3.75	605	12 12 1	1	L	March 25
	24	4211	4.37	600	12 10 0	1	S	" 29
Average of .	18	5733	3.80	727	15 2 11	7.3		
	15	5229	3.39	593	12 7 1	7	M	March 28
	5	5370	3.18	569	11 17 1	8	M	April 3
Cows yielding between 500 and 600 galls. milk of 3% of fat.	8	5088	3.25	551	11 9 7	9	M	March 19
	26	3822	4.21	536	11 3 1	6	M	Jan. 4
	37	4245	3.73	535	11 2 11	9	M	March 18
	4	4466	3.58	533	11 2 1	5	M	" 15
	12	4228	3.96	527	10 19 7	3	M	April 30
11 cows=29 % of the herd.	9	4761	3.31	526	10 19 2	15	M	June 7
	34	4225	3.71	523	10 17 11	4	S	April 6
	13	4571	3.39	517	10 15 5	4	S	March 23
	23	4196	3.67	514	10 11 2	3	.	April 1
Average of .	11	4563	3.56	511	11 5 5	6.2		
	36	3339	3.71	475	9 17 11	4	L	March 26
Cows yielding under 500 galls. of milk of 3% of fat.	25	3654	3.77	460	9 11 8	6	S	Jan. 3
	27	3983	3.34	443	9 4 7	15	M	Feb. 26
	39	3115	4.19	435	9 1 3	3	..	April 7
	33	3000	3.92	395	8 4 2	3	.	" 7

JAMES MOFFAT—continued.

	No. of cow.	Total milk in lbs.	Average of fat	Galls. milk of 3 c 11 t.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
9 cows = 23.7 % of the herd.	14	2840	4.02	380	£ s. d. 7 15 4	3	...	April 1
	38	2832	3.91	373	7 15 5	4	M	March 25
	2	3052	3.62	369	7 13 9	2	.	April 4
	15	3011	3.60	362	7 10 10	4	L	" 15
Average of .	9	3259	3.79	410	8 10 10	1.9		
Average of the whole herd .	38	4882	3.67	598	12 9 2			

MESSRS LINDSAY, WEST ROUGAN, DUMFRIES.

Cows yielding over 600 galls. milk of 3 7/8 of fat.	36	5292	4.08	722	15 0 10	8	M	April 1
	10	5502	3.89	713	11 17 1	6	L	March
	27	5779	3.65	701	11 13 4	8	M	"
	26	5131	3.71	678	11 2 6	6	M	"
9 cows = 19 % of the herd.	30	5636	3.60	677	11 2 1	8	S	May 21
	33	5238	3.71	619	13 10 0	5	M	April
	21	5191	3.72	641	13 8 1	7	M	"
	9	5171	3.11	623	12 19 7	6	M	" 28
	8	1323	1.11	600	12 10 0	6	M	"
Average of .	9	5318	3.77	668	13 13 4	6.6		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	41	5721	3.13	597	12 8 9	9	M	March
	17	5121	3.45	589	12 5 5	11	S	"
	22	4135	3.94	582	12 2 6	3	L	"
	34	4277	1.00	570	11 17 6	5	M	May 12
	60	4176	4.07	567	11 16 3	4	M	June 10
	43	1872	3.10	553	11 10 5	6	M	March
	41	5226	3.17	553	11 10 5	8	M	"
	31	4611	3.53	516	11 7 6	7	M	"
	7	3570	4.51	537	11 3 9	1	S	"
	62	1095	3.00	533	11 2 1	1	M	May 20
11 cows = 30 % of the herd.	35	1351	3.52	512	10 13 1	3	...	April
	2	1169	3.76	523	10 17 11	8	M	June 16
	1	1582	3.37	515	10 11 7	6	L	March
	15	3535	1.37	515	10 11 7	1	S	" 16
Average of .	11	1150	3.69	519	11 8 9	5.8		
Cows yielding under 500 galls. milk of 3 % of fat.	5	1071	3.65	196	10 6 8	7	M	March 27
	29	1111	3.56	192	10 5 0	4	M	April
	16	4333	3.10	491	10 1 7	5	S	Feb.
	3	3859	3.77	185	10 2 1	4	M	April
	12	3797	3.82	181	10 1 8	6	M	Feb.
	12	3630	3.43	169	9 15 5	5	S	April
	11	1120	3.10	467	9 11 7	6	S	March 16
	23	1017	3.15	466	9 11 2	6	M	"
	18	3502	3.99	166	9 11 2	5	S	April 1
	1	3218	1.23	159	9 11 3	8	M	March 16
	38	3665	3.73	156	9 10 0	5	M	April
	25	1071	3.36	157	9 10 5	6	S	June 3

Messrs LINDSAY—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
24 cows=51 % of the herd.	19	3330	4.03	448	£ 9 6 8	3	M	May
	20	3542	3.72	440	9 3 4	7	M	April
	6	3885	3.32	430	8 19 2	4	M	"
	28	3133	3.98	416	8 13 4	4	M	"
	13	3682	3.38	415	8 12 11	9	M	Jan. 25
	11	3975	3.00	397	8 5 5	9	M	March
	37	3210	3.60	386	8 0 10	3	...	April
	24	3224	3.55	384	8 0 0	6	M	March
	59	2741	4.18	382	7 19 2	3	...	June 11
	61	2790	4.10	382	7 19 2	3	...	May 19
	39	2777	3.72	345	7 3 9	4	M	April
	32	2432	3.35	272	5 13 4	6	M	Feb. 2
Average of	24	3533	3.67	432	9 0 0	5.3		
Average of the herd	47	4167	3.69	512	10 13 4			

W. SEMPLE, MOUSWALD BANKS, RUTHWELL.

Cows yielding over 600 galls. milk of 3 % of fat.	30	5033	4.34	723	15 3 4	7	M	March
	13	6125	3.53	721	15 0 5	7	M	April 3
	28	5933	3.58	708	14 15 0	6	M	" 27
	12	5474	3.75	685	14 5 5	7	M	" 3
	19	4701	4.04	634	13 4 2	4	M	" 27
	24	4981	3.81	633	13 3 9	7	M	March
9 cows=29 % of the herd.	7	5044	3.72	627	13 1 3	6	M	Feb. 1
	5	5796	3.11	606	12 12 6	5	M	April 7
	25	4793	3.76	601	12 10 5	7	M	Feb.
Average of	9	5720	3.50	660	13 15 0	6.2		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	22	4589	3.78	578	12 0 10	1	M	April 27
	6	4582	3.78	577	12 0 5	5	M	" 11
	4	5677	3.02	572	11 18 4	5	M	" 13
	15	4340	3.81	556	11 11 8	4	M	March 10
	2	4449	3.69	548	11 8 4	3	...	May 3
	20	4697	3.49	546	11 7 6	4	M	April 27
9 cows=29 % of the herd.	11	3992	4.00	533	11 2 1	4	M	March 4
	3	4354	3.66	531	11 1 3	5	M	April 2
	33	4695	3.28	514	10 14 2	4	M	" 27
Average of	9	4597	3.59	550	11 9 2	4.2		
Cows yielding under 500 galls. milk of 3 % of fat.	21	4074	3.58	486	10 2 6	4	M	April 27
	27	4746	3.07	486	10 2 6	6	S	May 2
	16	4015	3.46	462	9 12 6	2	...	" 15
	31	4316	3.15	454	9 9 2	7	M	Feb.
	26	3399	3.89	440	9 3 4	2	...	May 9
	23	3528	3.49	411	8 11 3	7	M	Feb. 5
	8	3077	3.90	400	8 6 8	2	...	May 12
	32	3059	3.91	399	8 6 3	5	M	Feb.
	14	3367	3.55	398	8 5 10	6	...	Jan. 29

W. SEMPLE—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 / of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
13 cows = 12% of the herd.	9	2089	3.71	373	£ 7 15 5	2	...	May 23
	1	3182	3.50	371	7 11 7	2	...	" 10
	18	2518	3.97	337	7 0 5	2	...	" 20
	17	2195	3.35	215	5 2 1	2	...	" 16
Average of .	13	3423	3.55	405	8 8 9	3 8		
Average of the herd . . .	31	4430	3.53	521	10 17 3			

WILLIAM SLOAN, SHAWSMUIR, THORNHILL.

	27*	7313	4.02	980	20 8 4	4	M	March
	3	6633	4.01	887	18 9 7	9	M	Feb.
	4	7591	3.36	852	17 15 0	9	L	March
	23	6493	3.79	821	17 2 1	3	...	April
	9	6052	3.94	796	16 11 8	8	M	Jan.
Cows yielding over 600 galls. milk of 3% of fat.	28	5678	4.06	769	16 0 5	4	M	"
	7	6307	3.31	693	14 10 10	7	M	Feb.
	13	5448	3.81	699	14 11 3	5	M	March
	14	5261	3.83	682	14 4 2	4	M	"
	18	5647	3.58	671	14 0 10	7	M	"
17 cows = 51.5% of the herd.	11	5466	3.69	673	14 0 5	5	M	Feb.
	17	5369	3.68	659	13 14 7	3	..	March
	26	5828	3.36	653	13 12 1	3	.	"
	5	5415	3.60	651	13 11 3	9	M	"
	1	5106	3.71	637	13 5 5	9	M	Dec.
	8	5264	3.47	610	12 14 2	7	M	Feb.
	31	4620	3.93	606	12 12 6	2	...	June 1
Average of .	17	5852	3.72	726	15 2 6	5 8		
	30	4774	3.75	597	12 8 9	4	M	Feb.
	29	4645	3.81	595	12 7 11	4	M	March
	33	4778	3.72	592	12 6 8	3	...	June 16
	19	4837	3.67	592	12 6 8	2	..	May 18
	25	4288	4.07	581	12 2 1	2	..	" 30
Cows yielding between 500 and 600 galls. milk of 3% of fat.	15	5387	3.23	581	12 2 1	5	M	March
	31	4316	4.02	578	12 0 10	2	..	June 11
	2	5173	3.35	578	12 0 10	3	.	Jan.
	22	4510	3.81	577	12 0 5	2	...	May 17
	32	1256	1.00	567	11 16 3	2	...	June 15
16 cows = 18.5% of the herd.	16	4557	3.60	517	11 7 11	3	...	Feb.
	20	1108	4.05	512	11 5 10	2	..	May 16
	31	4018	3.90	523	10 17 11	1	M	March
	12	4970	3.15	522	10 17 6	6	M	"
	6	1806	3.17	508	10 11 8	3	M	April
	31	3991	3.76	501	10 8 9	2	..	May 17
Average of .	16	1590	3.66	561	11 13 9	3		
Average of the herd . . .	33	5210	3.70	646	13 9 2			

* See fig. 1b, p. 22.

JOHN WILSON, BOGHEAD, DUMFRIES.

	No. of cow.	Total milk in lbs.	Average / of fat.	Galls. milk of 3 % of fat.	Value of produce at 6d. per gall.	Age of cow.	Size of cow.	Date of last calving.
Cows yielding over 600 galls. milk of 3 % of fat.	17	5555	3.76	696	£ s. d. 14 10 0	7	M	April 21
2 cows=87 % of the herd.	26	5185	3.11	621	13 0 0	4	S	May 20
Average of .	2	5520	3.59	660	13 15 0	5.5		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	12	4708	3.73	585	12 3 9	5	M	April 15
	19	4365	3.66	510	11 5 0	6	M	March 26
3 cows=13 % of the herd.	25	4712	3.30	519	10 16 3	6	M	April 3
Average of .	3	4595	3.57	515	11 7 1	5.7		
Cows yielding under 500 galls. milk of 3 % of fat.	3	4018	3.70	496	10 6 8	3	M	June 7
	21	4606	3.11	482	10 0 10	7	M	March 15
	24	3931	3.50	459	9 11 8	6	M	April 5
	11	3641	3.75	455	9 9 7	4	S	" 8
	10	4011	3.38	453	9 8 9	3	M	May 17
	1	3556	3.72	440	9 3 4	8	...	Feb. 20
	5	3325	3.88	430	8 19 2	2	M	June 5
	13	3312	4.00	417	8 13 9	7	S	Jan. 5
	2	3518	3.49	410	8 10 10	2	S	May 14
	6	3234	3.79	409	8 10 5	2	S	April 20
18 cows=78.8 % of the herd.	18	2664	4.52	402	8 7 6	4	M	Feb. 23
	8	2993	3.97	396	8 5 0	3	S	May 28
	22	2702	4.25	383	7 19 7	3	...	March 1
	15	2324	4.62	358	7 9 2	1	S	Dec. 28
	14	2376	4.26	338	7 0 10	5	M	Jan. 2
	27	2899	3.33	322	6 11 2	10	M	Feb. 1
	16	2331	4.02	313	6 10 5	1	M	Jan. 1
	7	2335	3.70	295	6 2 11	1	M	Dec. 15
Average of .	13	3209	3.76	403	8 7 11	4.5		
Average of the herd . . .	23	3590	3.71	444	9 5 0			

JOHN WILSON, TINWALDSHAWS, DUMFRIES.

Cows yielding over 600 galls. milk of 3 % of fat.	17	5688	3.71	709	14 15 5	7	M	March 7
	71	5362	3.68	659	13 14 7	7	M	May 23
	11	5132	3.62	655	13 12 11	9	L	March 1
	7	5369	3.65	653	13 12 1	11	M	" 12
	67	1365	3.90	633	13 3 9	8	M	Feb. 1
8 cows=17.8 % of the herd.	19	5184	3.62	626	13 0 10	12	M	March 1
	29	5565	3.38	617	12 17 1	1	L	May 19
	51	4921	3.75	616	12 16 8	4	S	" 2
Average of .	8	5208	3.66	647	13 9 7	7.7		

JOHN WILSON—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	1	1199	3.90	580	12 3 9	7	M	Feb. 1
	11	5012	3.13	573	11 18 9	7	M	" 3
	48	5313	3.19	506	11 15 10	8	M	April 1
	39	5115	3.27	562	11 11 2	7	M	March 1
	20	4377	3.80	555	11 11 3	10	M	Jan. 10
	53	3763	4.35	545	11 7 1	3	S	March 20
Cows yielding	12	4995	3.21	539	11 4 7	6	M	Feb. 10
over 500 galls.	62	4711	3.39	533	11 2 1	7	M	March 4
milk of 3 % of	3	1151	3.76	521	10 17 1	8	M	" 10
fat.	68	3766	1.15	522	10 17 6	8	M	Jan. 24
	22	4428	3.53	521	10 17 1	5	M	Feb. 14
20 cows=44.4 %	65	3920	3.98	521	10 17 1	8	M	April 1
of the herd.	56	5292	2.93	518	10 15 10	7	S	March 1
	26	4274	3.62	516	10 15 0	7	M	Jan. 6
	34	4211	3.66	515	10 14 7	3	S	April 1
	13	4715	3.24	510	10 12 6	4	M	Feb. 5
	33	4106	3.71	509	10 12 1	2	S	April 1
	31	4155	3.65	508	10 10 10	7	M	March 4
	42	4312	3.52	506	10 10 10	5	M	" 4
	72	4088	3.67	501	10 8 9	6	L	Jan. 14
Average of	20	1161	3.57	531	11 1 3	6.2		
	70	1277	3.13	169	10 3 9	9	M	Feb. 1
	16	1627	3.18	191	10 4 7	9	M	March 4
	58	1260	3.30	169	9 15 5	8	S	Feb. 1
	50	1886	2.87	169	9 15 5	7	S	" 1
	73	3668	3.80	165	9 12 11	6	S	" 10
Cows yielding	21	3721	3.75	166	9 13 1	5	S	" 28
over 400 galls.	11	3320	4.39	187	10 2 11	7	S	" 1
milk of 3 % of	10	4256	3.20	153	9 8 9	6	M	Feb. 6
fat.	57	3113	3.85	439	9 2 11	8	L	Jan. 26
	80	3321	3.92	431	9 0 10	4	M	May 1
17 cows=37.7 %	60	3448	3.68	421	8 16 8	5	S	March 3
of the herd.	82	3871	3.28	423	8 16 3	3	S	May 19
	69	3906	3.81	410	8 10 10	6	M	Jan. 19
	27	2839	4.07	385	8 0 5	5	M	Feb. 10
	54	2951	3.89	383	7 19 7	3	S	March 5
	21	2790	3.76	350	7 5 10	5	...	...
	28	2562	3.98	310	7 1 8	5	M	March 5
Average of	17	3165	3.76	431	9 0 10	6		
Average of the								
herd	45	1233	3.65	515	10 11 7			

P. WILSON, MURKIN, HOLLYWOOD.

Cows yielding	18	5800	3.32	613	13 7 11	8	S	April
over 600 galls.	13	5103	3.77	612	13 7 6	6	M	"
milk of 3 % of	33	5250	3.62	633	13 3 9	6	S	March
fat.	12	4987	3.77	628	13 1 8	10	M	"
	14	4445	4.19	622	12 19 2	11	M	"
7 cows=15.9 %	18	5474	3.33	609	12 13 9	5	L	April
of the herd.	3	4683	3.89	607	12 12 11	8	L	"
Average of	7	5045	3.71	629	13 2 1	8.2		

P. WILSON—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Gall. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	11	5264	3.33	585	£ 3 9	9	M	April
	44	4330	3.98	574	11 19 2	6	M	March
	32	4505	3.78	563	11 16 8	12	S	April
Cows yielding between 500 and 600 galls. milk of 3% of fat.	52	4298	3.90	559	11 12 11	3	.	May
	27	4274	3.89	555	11 11 3	10	M	Feb.
	30	4445	3.72	552	11 10 0	8	S	March 31
	41	4568	3.60	549	11 9 7	7	M	April 1
	37	4566	3.54	539	11 4 7	5	S	March 1
13 cows=29.6 % of the herd.	23	4960	3.18	527	10 19 7	6	M	April
	42	4183	3.73	521	10 17 1	4	S	"
	26	3962	3.94	520	10 16 8	3	.	"
	29	3903	3.96	515	10 14 7	11	S	March
	50	4739	3.18	502	10 9 2	12	.	April
Average of	18	4460	3.65	543	11 6 3	7.2		
	15	3659	4.03	491	10 4 7	6	M	Jan.
	9	4288	3.43	490	10 4 2	8	M	"
	2	3581	4.03	451	10 0 5	5	M	April
	25	3546	4.04	478	9 19 2	5	M	March 26
	19	4001	3.59	475	9 17 11	7	M	Feb.
	5	4032	3.53	474	9 17 6	6	M	Jan.
	38	3661	3.86	471	9 16 3	7	M	Feb.
	17	3742	3.77	471	9 16 3	5	M	April
Cows yielding under 500 galls. milk of 3% of fat.	34	3866	3.64	470	9 15 10	6	M	March
	22	4295	3.28	470	9 15 10	9	M	"
	6	3605	3.81	459	9 11 3	5	L	Jan.
	53	3626	3.79	458	9 10 10	3	.	May 19
	1	3297	3.97	437	9 2 1	5	M	March
24 cows=51.5 % of the herd.	51	3724	3.49	433	9 0 5	3	...	April
	16	3290	3.92	430	8 19 2	6	L	Jan.
	20	3223	3.80	408	8 10 0	7	L	Feb.
	13	3238	3.71	401	8 7 1	8	M	"
	7	3843	3.10	397	8 5 5	8	M	"
	49	3521	3.32	390	8 2 6	4	M	April
	10	3183	3.61	383	7 19 7	4	S	March
	4	2933	3.90	381	7 18 9	9	L	"
	21	3367	3.33	379	7 17 11	5	M	April
	23	2769	3.85	355	7 7 11	4	S	March
	35	2465	3.89	320	6 13 1	6	L	Jan.
Average of	24	3531	3.71	433	9 0 5	5.9		
Average of the herd	41	4046	3.67	495	10 6 3			

JAMES WYLLIE, WHITEHILL, SANQUHAR.

	30*	6682	3.90	870	18 2 6	.	M	May 10
	20	5913	1.13	818	17 0 10	8	M	April 23
	13	6503	3.58	777	16 3 9	9	M	March 13
Cows yielding over 600 galls. milk of 3% of fat.	1	6407	3.42	732	15 5 0	12	M	" 16
	25	5810	3.66	710	14 15 10	7	S	April 15
	9	6279	3.32	695	11 9 7	8	M	March 15
	24	5541	3.62	670	13 19 2	9	M	" 6
	22	5625	3.52	660	13 15 0	7	S	April 17

* See fig. 20, p. 220.

JAMES WYLLIE—*continued*.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
13 cows=13.3 % of the herd.	8	5369	3.63	650	13 10 10	8	M	April 2
	11	5352	3.14	615	12 16 3	7	M	May 1
	26	5130	3.56	607	12 12 11	6	S	April 7
	10	1876	3.74	608	12 13 4	7	M	March 14
	15	5065	3.60	608	12 13 4	8	M	" 27
Average of	13	5737	3.63	691	14 9 2	8		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	11	5120	3.31	570	11 17 6	8	L	April 27 ¹
	4	4288	3.95	561	11 15 0	3	...	March 3
	18	1582	3.53	539	11 4 7	11	M	" 6
	31	4855	3.27	531	11 1 3	...	S	May 12
	27	4876	3.26	530	11 0 10	8	L	March 16
	12	4641	3.42	530	11 0 10	7	M	" 2
	16	4609	3.42	526	10 19 2	8	M	" 27
10 cows=23.3 % of the herd.	21	4480	3.46	517	10 15 5	7	S	April 3
	17	3628	4.24	513	10 13 9	3	...	March 1
	29	4508	3.40	511	10 12 11	5	M	May 6
Average of	10	4558	3.51	533	11 2 1	6.6		
Cows yielding under 500 galls. milk of 3% of fat.	19	4091	3.59	491	10 4 7	3	...	Feb. 27
	3	1179	3.37	470	9 15 10	4	S	March 4
	2	3626	3.74	453	9 8 9	4	S	" 4
	5	3752	3.60	451	9 7 11	5	M	" 1
	6	2898	4.30	416	8 13 4	5	S	" 2
7 cows=23.4 % of the herd.	7	3276	3.77	411	8 11 8	2	...	" 27
	29	2112	3.95	283	5 17 11	3	...	" 8
Average of	7	3423	3.72	425	8 17 1	4.4		
Average of the herd	30	4804	3.61	578	12 0 10			

WIGTOWNSHIRE.

HUGH CHALMERS, CHILDRY.

	53	5086	3.71	629	13 2 1	8	S	May 1
Cows yielding between 500 and 600 galls. milk of 3% of fat.	16	4199	1.21	593	12 7 1	11	M	April 5
	13	1781	3.63	586	12 4 2	6	L	" 2
	39	4435	3.91	579	12 1 3	9	S	March 11
	52	3875	4.18	579	12 1 3	6	M	" 31
	21	1371	3.87	565	11 15 5	6	S	April 21
	11	5344	3.02	538	11 4 2	6	M	" 15
	56	3182	4.50	522	10 17 6	5	M	" 15
11 cows=18.3 % of the herd.	21	1592	3.38	515	10 14 7	5	M	March 30
	19	4579	3.36	513	10 13 9	7	M	" 7

* One test blind.

HUGH CHALMERS—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	30	4880	3.13	509	£ s. d. 10 12 1	10	M	March 21
	20	3924	3.84	502	10 9 2	7	M	" 13
Average of	11	4406	3.71	546	11 7 6	7.09		
Cows yielding under 500 galls. milk of 3 % of fat. 48 cows=80 % of the herd.	44	4003	3.73	499	10 7 11	7	M	April 23
	42	4549	3.26	494	10 5 10	10	L	March 9
	37	3836	3.86	494	10 5 10	14	S	Feb. 3
	15	3830	3.85	492	10 5 0	8	S	March 12
	28	3975	3.68	488	10 3 4	14	S	Feb. 26
	5	4147	3.46	478	9 19 2	9	M	March 10
	55	3966	3.61	477	9 18 9	5	M	April 9
	26	4436	3.15	471	9 16 3	13	S	" 4
	59	4017	3.45	462	9 12 6	11	M	May 15
	35	3756	3.66	453	9 10 10	11	M	March 11
	49	3335	4.03	443	9 6 8	6	M	Feb. 25
	58	4045	3.31	447	9 6 3	6	S	March 1
	54	3492	3.83	446	9 5 10	8	L	" 25
	7	3580	3.73	445	9 5 5	5	M	April 8
	36	4196	3.17	444	9 5 0	10	L	March 5
	3	3111	4.24	440	9 3 4	3	S	April 7
	4	3423	3.73	426	8 17 6	7	L	March 19
	45	4340	2.94	425	8 17 1	7	M	" 6
	34	3830	3.29	420	8 15 0	8	M	" 18
	12	3263	3.84	419	8 14 7	6	S	" 21
	2	2993	4.19	418	8 14 2	3	S	April 10
	57	3033	3.98	409	8 10 5	5	M	March 13
	51	3417	3.54	403	8 7 11	6	S	April 26
	50	3036	3.86	397	8 5 5	8	S	Feb. 28
	48	3716	3.20	397	8 5 5	8	L	" 12
	60	3044	3.33	389	8 2 1	6	S	April 17
	10	3023	3.74	377	7 17 1	5	M	Feb. 23
	1	3002	3.55	355	7 7 11	3	S	April 20
	32	3079	3.42	351	7 6 3	9	M	March 9
	23	3233	3.25	350	7 5 10	6	S	May 19
	25	3255	3.22	350	7 5 10	10	M	March 11
	17	3647	2.87	349	7 5 5	6	L	" 24
	41	2979	3.50	348	7 5 0	14	M	Feb. 11
	27	3021	3.45	347	7 1 7	10	M	" 3
	38	3311	3.13	346	7 4 2	10	M	March 4
	47	2902	3.39	328	6 16 8	10	L	Feb. 2
	8	2806	3.46	324	6 15 0	7	M	May 20
	31	2660	3.56	316	6 11 8	15	S	March 1
	33	2901	3.25	315	6 11 3	9	S	" 8
	22	2402	3.83	307	6 7 11	6	...	" *
	16	2722	3.35	304	6 6 8	7	S	Feb. 10
	29	2691	3.34	300	6 5 0	10	S	March 17
	6	2834	2.82	266	5 10 10	7	M	Feb. 20
	40	2174	3.47	252	5 5 0	8	M	" 9
	9	2219	3.29	244	5 1 8	10	M	March 9
	14	2192	3.31	242	5 0 10	...	..	" †
	13	1943	3.25	210	4 7 6	6	M	Feb. 2
	18	1650	3.52	194	4 0 10	3	M	Nov. 2, '02
Average of	48	3274	3.50	383	7 19 7	8		
Per cow per day— Strippings		1.9	6.82	4.32 lb.				

* Sold, September 2.

† Only tested six times; became ill.

J. CHALMERS—*continued.*

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3% of fat.	Value of produce at 5d. per gall	Age of cow.	Size of cow.	Date of last calving.
	3	2930	3.05	386	£ 8 0 10	8	L	April 6
	53	3108	3.73	386	8 0 10	1	M	Jan. 7
	42	3693	3.08	330	7 18 1	9	S	April 2
	33	3211	3.29	355	7 7 11	5	S	Jan. 29
	45	2705	4.01	337	7 0 5	5	M	Feb. 13
	19	3033	3.25	329	6 17 1	4	S	Jan. 20
	15	2759	3.55	327	6 16 3	5	M	" 10
	38	2801	3.48	325	6 15 5	4	M	March 28
	60	2313	3.60	278	5 15 10	9	L	Feb. 22
	1	1302	4.25	181	3 16 9	2		" 16
Average of	31	3538	3.59	421	8 16 8	6.23		
Per cow per day—								
Strippings	.	1.5	6.53	3.26 lb.				
Morning milk	.	...	1.06	...				
Evening "	.	.	3.83	...				

JOHN CRAIG, GREYHILL.

Cows yielding over 600 galls. milk of 3% of fat	26 14 22	6611 5638 5274	3.54 3.77 3.93	780 709 690	16 5 0 14 15 5 14 7 6	6 5 6	M M S	April 27 March 4 Feb. 22
11 cows = 11.5% of the herd.	5 15 36	5339 5117 4792	3.81 3.63 3.81	684 620 613	14 5 0 13 18 4 12 15 5	8 8 10	L S M	March 4 " 9 " 15
Average of	6	5470	3.74	653	14 1 7	7.1		
	3 39 50 27 19 48 17 45 10 21 16 40 30 11 31 4 35 11 24 9 28	4638 5914 4582 1987 4778 4558 4284 1319 4193 1661 5106 1523 4262 1070 4397 3683 4611 5144 3356 3592 3520	3.85 3.01 3.79 3.41 3.57 3.73 3.91 3.88 3.91 3.54 3.22 3.63 3.81 3.91 3.61 4.00 3.81 4.17 4.58 4.23 4.28	595 593 579 572 569 568 563 559 551 550 519 517 516 531 529 517 515 513 513 507 503	12 7 11 12 7 1 12 1 3 11 18 4 11 17 1 11 16 8 11 11 7 11 12 11 11 9 7 11 9 2 11 8 9 11 7 11 11 7 6 11 1 3 11 0 5 10 15 5 10 11 7 10 13 9 10 13 9 10 11 3 10 9 7	5 7 8 8 4 6 4 4 5 7 9 3 11 5 3 4 5 8 3 3 5	S L M M L M M S M S M M S M L S S S S	March 11 " 7 Feb. 23 March 21 " 20 Feb. 17 Dec. 21, '02 March 4 Feb. 7 May 7 March 21 " 27 Jan. 10 Feb. 21 April 20 Feb. 25 April 2 Jan. 17 Jan. 20 March 11 " 10
Average of	21	4365	3.7	516	11 7 6	5.47		

JOHN CRAIG—continued.

	No. of cow.	Total milk in lbs.	Average ' of fat	Galls. milk of 3 ' of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
					£ s. d.			
	8	4155	3.56	494	10 5 10	5	M	Feb. 25
	12	4406	3.85	492	10 5 0	18	L	March 6
	17	3791	3.84	485	10 2 1	5	M	Feb. 17
	37	3718	3.8	474	9 17 6	6	M	April 5
	20	3831	3.70	470	9 15 10	11	M	March 6
	12	3875	3.61	467	9 11 7	3	S	Feb. 20
	13	3852	4.13	462	9 12 6	4	S	Jan. 12
	32	4215	3.29	462	9 12 6	8	M	March 17
	19	4558	2.96	451	9 7 11	4	S	April 7
Cows yielding under 500 galls. milk of 3% of fat.	31	3405	3.77	429	8 18 9	2	S	May 1
	33	3161	3.98	420	8 15 0	7	S	Feb. 8
	16	3625	3.17	419	8 14 7	3	S	June 22
	1	3167	3.89	411	8 11 3	7	S	Jan. 4
25 cows=48.07% of the herd.	38	3580	3.39	405	8 8 9	3	V.S.	March 28
	25	3053	3.40	397	8 5 5	3	M	Jan. 7
	23	3627	3.16	383	7 19 7	14	S	March 11
	41	2988	3.79	378	7 17 6	10	S	Dec. 11, '02
	18	2883	3.94	375	7 16 3	5	S	Feb. 20
	52	3396	3.21	364	7 11 8	8	M	Dec. 21, '02
	2	2684	3.87	346	7 4 2	3	S	Jan. 20
	7	2885	3.40	337	7 0 5	5	S	March 14
	43	2132	3.99	324	6 15 0	5	M	Dec. 20, '02
	6	2712	3.51	318	6 12 6	3	S	March 1
	29	2533	3.63	307	6 7 11	5	L	Jan. 20
	51	2122	3.36	238	4 19 2	3	M	Feb. 8
Average of .	25	3367	3.6	404	8 8 1	5.8		
Per cow per day—								
Strippings .		.41	7.0	1 03 lb.				
Morning milk .		...	3.82	...				
Evening " .		...	3.86	...				

ANDREW COCHRAN, HIGH ARDWELL, KIRKCOLM.

Cows yielding over 600 galls milk of 3% of fat	32	4628	4.13	638	13 5 10	5	M	Feb. 20
	21	3780	4.81	611	12 11 7	6	M	" 16
3 cows 7.69% of the herd.	27	5031	3.58	601	12 10 5	5	M	May 29
Average of .	3	4480	4.13	617	12 17 1	5.33		
Cows yielding between 300 and 600 galls milk of 3% of fat	20	4215	4.16	589	12 5 5	6	S	Jan. 8
	30	4191	3.85	578	12 0 10	5	S	May 26
1 cows 10.45% of the herd.	22	4650	3.60	558	11 12 6	5	M	" 22
	13	4275	3.71	529	11 0 5	8	M	Jan. 7
Average of .	1	4415	3.82	503	11 11 7	6		
	23	4389	3.37	494	10 5 10	7	M	Dec. 26, '02
	25	4068	3.61	491	10 5 10	3	S	March 29
	39	3223	4.51	485	10 2 1	2	M	April 18
	31	3898	3.72	483	10 1 3	5	M	March 15
	4	3633	3.06	480	10 0 0	3	S	" 15

ANDREW COCHRAN—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 8 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	8	3910	3.64	474	£ s. d. 9 17 6	4	M	Jan. 4
	33	3963	3.43	453	9 8 9	12	S	March 8
	7	3416	3.81	437	9 2 1	5	L	Jan. 8
	11	3311	3.84	424	8 16 8	2	M	March 27
	3	3915	3.19	417	8 13 9	3	S	" 12
	31	3501	3.64	413	8 12 1	11	L	Dec. 1, '02
	14	3060	3.72	379	7 17 11	6	S	Jan. 10
Cows yielding	26	2642	4.16	367	7 12 11	4	S	March 20
under 500	15	2842	3.79	359	7 9 7	3	S	" 15
galls. milk of	12	3236	3.24	355	7 7 11	8	M	" 18
3 % of fat.	18	2741	3.85	352	7 6 8	5	S	Jan. 14
	16	2738	3.83	350	7 5 10	6	L	March 15
32 cows = 82.08 %	2	2708	3.86	348	7 5 0	3	S	" 8
of the herd.	17	3311	3.13	316	7 4 2	7	M	Dec. 28, '02
	6	2710	3.69	333	6 13 9	5	M	Feb. 21
	37	2877	3.43	329	6 17 1	8	M	Dec. 11, '02
	35	2400	3.61	289	6 0 5	5	M	March 2
	36	2043	4.21	287	5 19 7	7	M	Dec. 6, '02
	1	1830	4.51	275	5 14 7	3	M	March 18
	9	2290	3.26	249	5 3 9	8	M	Dec. 29, '02
	20	1933	3.68	237	4 18 9	8	M	Jan. 28
	38	1737	4.02	232	4 16 8	6	S	Nov. 14, '02
	5	1943	3.19	226	4 14 2	6	M	Feb. 14
	21	2029	3.12	211	4 7 11	6	M	Dec. 22, '02
	28	1845	3.25	200	4 3 4	10	L	" 1, '02
	19	1771	3.25	192	4 0 0	7	...	" 1, '02
	10	851	3.62	103	2 2 11	5	M	March 24
Average of	32	2838	3.6	346	7 4 2	5.7		
Per cow per day—								
Strippings	.	1.6	7.5	4 lb.				
Morning milk	.	...	4.15	...				
Evening "	.	...	4.35	...				

T. C. CUNNINGHAME, DUNRAGIT HOME FARM, DUNRAGIT.

	27	4239	4.23	606	12 12 6	5	M	...
	14	4070	4.39	596	12 8 1	1	S	...
	2	4885	3.60	586	12 4 2	10	M	...
	6	5006	3.37	563	11 14 7	5	M	...
Cows yielding	19	4778	3.40	542	11 5 10	12	M	...
between 500	24	4665	3.47	540	11 5 0	6	M	...
and 600 galls.	20	4131	3.90	537	11 3 9	5	S	...
milk of 3 % of	44	4124	3.83	533	11 2 1	9	S	...
fat.	28	4346	3.64	528	11 0 0	8	M	...
	22	4264	3.71	527	10 19 7	6	S	...
14 cows = 24.1 %	18	4180	3.75	523	10 17 11	4	M	...
of the herd.	40	3356	4.62	516	10 15 0	4	M	...
	56	4444	3.45	511	10 12 11	11	M	...
	45	4063	3.74	507	10 11 3	6	L	...
	50	4798	3.13	500	10 8 4	6	M	...
Average of	14	4365	3.68	536	11 3 4	6.35		

T. C. CUNNINGHAM—continued.

	No. of cow.	Total milk in lbs.	Average of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	21	4165	3.55	493	£ s. d. 10 5 5	10	S	...
	11	3168	4.85	492	10 5 0	3	S	...
	37	3654	4.03	491	10 4 7	3	S	...
	51	4133	3.54	488	10 3 4	6	S	...
	17	4197	3.47	486	10 2 6	7	M	...
	41	4471	3.23	482	10 0 10	4	S	...
	43	4721	3.06	481	10 0 5	9	S	...
	23	3559	4.02	477	9 18 9	4	M	...
	57	3048	3.60	474	9 17 6	7	M	...
	52	4136	3.41	471	9 16 3	6	M	...
	15	3556	3.97	471	9 16 3	1	S	...
	49	4054	3.46	468	9 15 0	5	S	...
	53	3721	3.74	461	9 13 4	1	M	...
	12	3889	3.57	463	9 12 11	4	S	...
	47	3501	3.87	451	9 7 11	6	S	...
	54	3399	3.94	447	9 6 3	3	...	...
	7	3570	3.74	445	9 5 5	4	S	...
	58	3853	3.43	441	9 3 9	6	S	...
Cows yielding	33	3202	4.13	440	9 3 4	3	S	...
under 500	5	3676	3.57	438	9 2 6	5	S	...
galls. milk of	3	3954	3.32	438	9 2 6	4	S	...
3 % of fat.	36	4131	3.16	435	9 1 3	11	M	...
	13	3909	3.30	431	8 19 7	5	S	...
13 cows=71.1 %	33	3647	3.51	427	8 17 11	4	S	...
of the herd.	1	3137	3.98	417	8 13 9	3	S	...
	35	3633	3.14	417	8 13 9	3	S	...
	30	4501	2.71	408	8 10 0	9	M	...
	31	3666	3.32	406	8 9 2	9	S	...
	9	3143	3.52	404	8 8 4	3	S	...
	25	3356	3.61	403	8 7 11	3	S	...
	10	2999	4.02	402	8 7 6	3	S	...
	29	3046	3.89	396	8 5 0	3	S	...
	31	2640	4.44	391	8 2 11	3	M	...
	4	3693	2.97	366	7 12 6	11	S	...
	8	4028	2.70	363	7 11 3	3	S	...
	26	3108	3.49	361	7 10 5	3	M	...
	18	3123	3.13	357	7 8 9	4	S	...
	39	2941	3.48	341	7 2 1	5	M	...
	42	2776	3.61	334	6 19 2	9	M	...
	16	3538	2.73	322	6 14 2	12	L	...
	55	2147	3.88	316	6 11 8	4	M	...
	32	2384	3.92	311	6 9 7	11	M	...
	16	3297	2.66	293	6 2 1	6	S	...
Average of	13	3588	3.52	421	8 15 5	5.4		
Morning milk	...	...	3.85					
Evening "	...	...	4.00					

J. M'CAIG, CHALLOCH, LESWALT.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
					£ s. d.			
Cows yielding over 600 galls. milk of 3 % of fat.	41	5062	4.13	698	14 10 10	8	S	March 28
	54	5426	3.70	669	13 18 9	10	L	Feb. 17
	48	4992	4.01	668	13 18 4	7	M	March 1
	39	5326	3.71	659	13 14 7	8	M	May 3
	1	5236	3.75	655	13 12 11	8	S	April 16
	34	4719	4.02	634	13 4 2	10	L	March 10
9 cows=15 % of the herd.	42	4711	4.03	633	13 3 9	7	S	April 3
	26	4557	4.1	623	12 19 7	9	M	Feb. 12
	16	5250	3.54	620	12 18 4	8	M	" 21
Average of	9	5031	3.88	651	13 11 3	8.3		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	59	4337	4.01	581	12 2 1	7	M	Feb. 17
	5	4593	3.75	574	11 19 2	5	L	April 11
	52	4235	4.00	572	11 18 1	8	M	Feb. 5
	23	4549	3.75	570	11 17 6	10	L	April 5
	11	4844	3.41	551	11 9 7	8	M	Feb. 26
	40	4732	3.47	548	11 8 4	1	M	March 21
	33	3822	4.27	545	11 7 1	7	M	Feb. 19
	57	4215	3.84	540	11 5 0	4	M	April 20
	13	4962	3.23	534	11 2 6	8	M	March 2
	12	3986	3.98	522	10 17 6	7	S	Feb. 28
	50	3905	3.92	510	10 12 6	5	L	" "
	37	3977	3.81	506	10 10 10	10	L	Feb. 5
	20	4413	3.42	501	10 10 0	9	L	" 15
	35	4385	3.44	503	10 9 7	7	M	" 22
Average of	14	4357	3.71	540	11 5 0	7.07		
Cows yielding under 500 galls. milk of 3 % of fat.	21	4130	3.61	497	10 7 1	4	M	April 11
	49	3143	4.73	496	10 6 8	10	L	Feb. 9
	22	4503	3.28	493	10 5 5	7	M	" 19
	3	4148	3.55	492	10 5 0	6	M	" 10
	10	3935	3.72	488	10 3 1	7	V.S.	" 2
	43	3863	3.78	487	10 2 11	9	L	" 18
	15	3976	3.61	483	10 1 3	7	M	March 5
	28	3987	3.53	469	9 15 5	7	S	Feb. 11
	47	3741	3.75	468	9 15 0	4	S	" 12
	24	3906	3.57	466	9 11 2	10	M	" 6
	51	3317	4.12	456	9 10 0	4	M	" 23
	25	3784	3.66	456	9 10 0	4	M	" 11
	38	3707	3.66	453	9 8 9	11	L	" 2
	18	4059	3.30	446	9 5 10	9	L	" 11
	29	4066	3.27	444	9 5 0	9	S	" 7
	45	3919	3.40	444	9 5 0	1	S	April 1
	9	3933	3.31	434	9 0 10	8	M	March 10
	14	3262	4.00	434	9 0 10	5	S	Feb. 13
	41	4012	3.22	431	8 19 7	4	S	March 19
	8	3500	4.07	429	8 18 9	6	S	Feb. 28
	19	3389	3.79	428	8 18 4	10	M	" 1
	31	3567	3.59	426	8 17 6	4	M	" 20
	7	3270	3.88	423	8 16 3	6	M	" 28
	55	3325	3.76	417	8 13 9	11	M	March 10
	56	3207	3.87	414	8 12 6	3	M	Feb. 18
	30	3211	3.79	409	8 10 5	3	M	March 8
	2	3043	3.95	401	8 7 1	6	M	Feb. 27

J. M'CAIG—continued.

	No. of cow.	Total milk in lbs.	Average ' of fat.	Galls. milk of 3 of fat.	Value of produce at 5d. per gall	Age of cow.	Size of cow.	Date of last calving.
	17	3188	3.76	100	8 6 5	5	M	April 12
	53	3052	3.85	393	8 3 9	8	L	Feb. 22
	58	3015	3.84	390	8 2 6	7	M	" 11
	27	3290	3.51	389	8 2 1	6	S	" 12
	46	3220	3.44	370	7 14 2	7	M	" 25
	60	2817	3.71	328	6 16 8	2	M	" 20
	36	3010	3.22	321	6 15 0	4	M	" 14
	1	2681	3.62	323	6 11 7	6	M	" 27
	32	2818	3.61	279	5 16 3	4	M	" 10
	6	1926	1.32	278	5 15 10	6	..	" 18
Average of	37	3166	3.66	423	8 16 3	6.29		
Per cow per day—								
Strippings	1	7.2	2.1 lb.					
Morning milk	...	3.83	...					
Evening "	...	3.92	...					

R. S. M'CAIG, KILHILT, LOCHANB.

Cows yielding over 600 galls of milk of 3% of fat	16	1995	1.25	707	14 11 7	6	M	..
	52	5152	3 17	650	13 2 6	10	L	.
3 cows 55% of the herd	37	1935	3.77	621	12 18 9	5	L	.
Average of	3	5127	3.8	653	13 12 1	7		
	3	5373	3.31	593	12 7 1	5	M	...
	7	3811	1.52	574	11 19 2	8	M	...
	10	4555	3.76	572	11 18 4	8	S	...
	41	5254	3.26	571	11 17 11	5	L	...
	18	4877	3.47	564	11 15 0	5	S	...
	51	5229	3.23	563	11 11 7	6	S	June 3
	12	5084	3.85	562	11 14 2	7	M	...
	13	4560	3.60	561	11 13 9	7	M	...
	53	4298	3.88	557	11 12 1	10	M	...
	14	5027	3.27	549	11 8 9	7	L	...
	10	1311	3.95	535	11 2 11	7	M	...
	11	1738	3.85	529	11 0 5	4	L†	...
	6	1361	3.62	527	10 19 7	6	M	...
	15	1313	3.63	523	10 17 11	6	S	...
	49	3119	1.53	521	10 17 1	3	M	...
	27	1120	3.78	520	10 16 8	6	M	...
	32	1326	3.60	520	10 16 8	3	M	...
	21	3893	3.95	516	10 15 0	6	M	...
	51	3812	4.03	518	10 15 0	3	M	...
	50	1119	3.17	515	10 14 7	4	M	...
	25	1170	3.49	511	10 14 2	7	M	...
	43	1361	3.51	513	10 13 9	6	M	...
	24		3.81	509	10 12 1	6	M	...
	38	3326	4.51	501	10 12 1	3	M	...
	29	3613	1.18	503	10 11 8	4	S	...
Average of	25	4222	3 8	537	11 3 9	5.7		

* Aborted, April 12.

† Cross-bred cow.

R. S. M'CAIG—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	15	3591	4.13	494	10 5 10	4	L	...
	33	3569	4.03	486	10 2 6	4	M	...
	30	4134	3.50	482	10 0 10	4	M	...
	5	3535	3.99	471	9 16 3	8	S	...
	35	4400	3.20	470	9 15 10	5	L	...
	22	3636	3.87	470	9 15 10	5	S	...
	20	3235	4.34	468	9 15 0	8	S	...
	4	3829	3.66	467	9 14 7	9	S	...
	31	2752	4.96	454	9 9 2	3	L	...
Cows yielding	23	4507	2.95	444	9 5 0	5	M	...
under 500	28	3387	3.53	438	9 4 2	3	M	...
galls. milk of	16	3926	3.33	437	9 3 9	3	L	...
3 % of fat.	8	3377	3.87	436	9 3 4	6	M	...
	9	3212	3.96	425	8 17 1	4	M†	...
26 cows=48.2 %	1	2705	4.61	422	8 15 10	4	S	...
of the herd.	36	3573	3.51	418	8 11 2	9	L	...
	47	3045	4.11	417	8 13 9	4	L	...
	17	3384	3.65	411	8 11 3	3	L†	...
	39	2699	4.48	403	8 7 11	3	L	...
	19	3277	3.63	397	8 5 5	5	S	...
	11	2821	4.20	395	8 4 7	3	S	...
	42	2838	4.15	393	8 3 9	3	L	...
	48	2685	4.21	377	7 17 1	4	S	...
	26	2876	3.91	375	7 16 3	4	M	...
	34	2561	4.23	366	7 12 6	5	M	...
	2	1897	4.96	313	6 10 5	2	S	...
Average of	26	3236	3.9	423	8 18 4	4.6		
Per cow per day—								
Strippings		.32	9.22	.93 lb.	0 0 0½			
Morning milk		...	4.01	...	...	
Evening "		...	4.01	...	...	

A. & J. M'GILL, KILDONNAN, STONEYKIRK.

Cows yielding over	42	5979	3.76	751	15 12 11	4	L	March 28
600 galls. milk of	41	4774	4.48	714	14 17 6	7	M	" 16
3 % of fat.	43	5398	2.92	705	14 13 9	10	S	Feb. 27
	40	4598	4.36	688	13 18 4	5	M	March 10
6 cows=12 % of the	49	4943	3.97	655	13 12 11	2	L	April 11
herd.	22	6243	3.13	653	13 12 1	8	M	March 13
Average of	6	5322	3.89	691	14 7 11	6		
	35	4395	4.02	590	12 5 10	9	M	March 1
	3	5238	3.25	573	11 18 9	7	L	" 31
	44	4949	3.46	572	11 18 4	5	S	April 8
	29	4154	4.00	561	11 13 9	5	M	March 15
	30	4165	3.91	547	11 7 11	8	M	Jan. 26
Cows yielding	14	3023	3.26	547	11 7 11	13	M	March 1
between 500	5	5187	3.12	540	11 5 0	13	L	Feb. 12
and 600 galls.	36	4152	3.90	539	11 4 7	4	M	" 13

* Cross-bred cow.

† Galloway cow.

‡ Cross-bred cow.

A. & J. M'GILL—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
milk of 3 % of fat.	11	3888	4.15	538	11 1 2	2	S	April 23
	25	1922	3.26	536	11 3 4	6	L	Feb. 15
	15	4680	3.44	536	11 3 4	10	L	March 16
	15	3993	4.00	533	11 2 1	1	S	Feb. 28
	19	4070	3.90	530	11 0 10	4	M	March 17
	17	4781	3.30	526	10 19 2	9	S	" 11
	7	3521	4.43	521	10 17 1	7	M	Feb. 27
	37	4361	3.50	509	10 12 1	7	M	" 7
	28	4556	3.35	509	10 12 1	8	L	" 26
	9	4200	3.53	501	10 8 9	11	S	March 1
Average of	18	4461	3.62	539	11 4 7	7.3		
Cows yielding under 500 galls. milk of 3 % of fat.	31	3893	3.77	489	10 3 9	9	M	March 30
	16	4122	3.55	489	10 3 9	7	M	Feb. 23
	21	3632	3.95	484	10 1 8	7	M	" 22
	2	3444	4.10	471	9 16 3	4	M	" 16
	32	3626	3.89	470	9 15 10	2	M	April 17
	52	3609	3.80	468	9 15 0	2	M	March 25
	24	4623	3.04	468	9 15 0	6	M	Feb. 12
	13	4152	3.13	465	9 13 9	7	L	" 28
	1	3628	3.78	457	9 10 5	5	M	" 7
	20	3762	3.60	450	9 7 6	6	S	" 12
	39	3312	3.97	442	9 4 2	9	M	Jan. 24
	26	4032	3.25	438	9 2 6	12	L	March 11
	51	3179	3.95	419	8 14 7	2	M	April 20
	8	4165	2.95	410	8 10 10	13	M	Feb. 12
	12	2758	4.4	407	8 9 7	4	S	" 11
	18	3612	3.35	404	8 8 4	12	M	Jan. 30
	10	3900	3.02	393	8 3 9	3	L	Feb. 18
	48	3478	3.36	389	8 2 1	3	S	June 2
	38	3447	3.36	380	7 18 4	9	M	Jan. 24
	27	3154	3.57	375	7 16 3	9	M	Feb. 1
	50	2471	4.52	373	7 15 5	2	L	July 1
	4	3363	3.26	365	7 12 1	3	M	May 14
	47	3175	3.34	351	7 7 6	3	M	June 14
	16	3116	3.09	321	6 13 9	3	M	April 6
	6	2866	3.18	304	6 6 8	3	M	" 3
	23	919	3.96	125	2 12 1	14	M	" 21
Average of	26	3456	3.51	408	8 10 0	6.11		
Per cow per day—				lb.				
Strippings	.	.73	8.01	1.956				
Morning milk	.	...	3.45	...				
Evening "	.	...	4.07	...				

JOHN M'HARGH, MERSLAUGH.

Cows yielding between 500 and 600 galls milk of 3 % of fat.	15	3874	4.51	536	12 1 2	7	M	...
	35	4205	3.74	537	11 3 9	5	M	...
3 cows=58 % of the herd.	50	3643	4.18	508	10 11 8	4	M	...
Average of	3	3937	4.1	544	11 6 8	5.3		

JOHN M'HARGH—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	10	3768	3.91	490	£ s. d. 10 4 2	5	M	
	7	3471	4.23	489	10 3 9	5	M	.
	19	3660	4.00	488	10 3 4	2	S	.
	43	3542	4.12	487	10 2 11	6	S	
	36	3710	3.81	472	9 16 8	7	M	
	25	4075	3.44	468	9 15 0	4	M	
	45	3507	3.91	457	9 10 5	5	S	.
	38	3482	3.92	455	9 9 7	1	M	
	32	3857	3.53	455	9 9 7	6	M	
	39	3840	3.16	444	9 5 0	7	L	
	31	3490	3.79	441	9 3 9	5	S	
	47	3644	3.63	440	9 3 4	5	M	
	3	4067	3.23	431	9 0 10	6	S	
	23	3926	3.31	433	9 0 5	9	S	
	37	3599	3.61	433	9 0 5	9	S	
	27	3492	3.66	426	8 17 6	5	L	
	16	2762	4.62	425	8 17 1	7	M	
	9	2814	4.49	422	8 15 10	2	M	June 10
	5	2762	4.41	406	8 9 2	7	M	
	30	3546	3.38	399	8 6 3	5	S	
Cows yielding	4	3129	3.81	398	8 5 10	5	S	
under 500	34	3048	3.92	398	8 5 10	4	M	
galls. milk of	26	3436	3.46	396	8 5 0	6	L	
3 % of fat.	42	3426	3.45	394	8 4 2	5	S	
	41	3227	3.57	384	8 0 0	4	S	
48 cows=94.11	40	3069	3.73	382	7 19 2	4	S	
of the herd.	44	3080	3.70	380	7 18 4	5	M	
	17	3045	3.70	376	7 16 8	8	S	.
	1	3867	3.35	376	7 16 8	5	S	
	28	2870	3.81	365	7 12 1	2	M	
	46	2979	3.65	362	7 10 10	2	M	June 18
	12	3199	3.39	362	7 10 10	8	S	
	13	2778	3.91	362	7 10 10	2	M	
	21	3403	3.14	357	7 8 9	8	M	
	14	2962	3.59	351	7 7 6	5	M	
	48	2741	3.85	352	7 6 8	4	M	
	18	3081	3.29	339	7 1 3	5	S	
	51	2518	3.81	323	6 11 7	1	M	
	2	2078	3.08	313	6 10 5	2	M	July 5
	33	2362	3.93	309	6 8 9	4	M	.
	21	2373	3.89	307	6 7 11	7	M	..
	11	2323	3.90	302	6 5 10	8	M	...
	29	2311	3.67	283	5 17 11	7	S	...
	6	2365	3.58	282	5 17 1	5	L	...
	20	2376	3.48	275	5 14 7	8	S	..
	8	2154	3.78	266	5 10 10	5	S	..
	52	2003	3.86	191	3 19 7	...	M	..
	49	1088	3.46	125	2 12 1	4	M	
Average of	48	3080	3.7	380	7 18 4	5.11		
Per cow per day—								
Strippings	.	.86	7.00	2.17 lb.				
Morning milk	.	...	3.77	...				
Evening "	.	...	3.83	...				

W. PARKER, INCHPARK, STRANRAER.

	No. of cow.	Total milk in lbs.	Average / of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
Cows yielding over 500 galls milk of 3 % of fat	27	1835	1.11	662	13 15 10	8	M	Jan. 21
	43	5162	3.79	652	13 11 8	8	L	" 19
1 cows 0.97 % of the herd.	18	5301	3.67	619	13 10 5	6	M	March 15
Average of	3	5100	3.81	651	13 12 6	7.3		
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	3	4427	3.93	579	12 1 3	3	S	May 7
	9	4943	3.52	579	12 1 3	5	M	Feb. 14
	6	4173	4.08	568	11 16 8	5	M	" 16
	28	4190	3.8	568	11 16 8	3	M	April 7
	18	4981	3.41	566	11 15 10	5	M	" 15
	16	5222	3.23	562	11 14 2	6	L	" 8
	23	4990	3.32	552	11 10 0	4	S	" 8
	39	5058	3.21	541	11 5 5	8	S	Jan. 9
	26	3829	4.08	521	10 17 1	5	M	Feb. 27
	32	4262	3.66	520	10 16 8	12	M	" 15
	31	4551	3.42	519	10 16 3	7	S	Jan. 20
	7	4287	3.63	519	10 16 3	5	M	Dec. 14, '02
	21	4382	3.54	517	10 15 5	3	M	April 7
	38	4581	3.38	516	10 15 0	5	S	June 12
	15	4781	3.23	514	10 14 2	7	L	Dec. 16, '02
	1	4789	3.20	511	10 12 11	5	M	March 3
	30	4150	3.63	510	10 12 6	8	S	Jan. 1
	36	3907	3.48	505	10 10 5	5	M	Feb. 3
	34	3883	3.83	503	10 9 7	3	S	March 13
Average of	19	4510	3.55	535	11 2 11	5.12		
Cows yielding under 500 galls. milk of 3 % of fat.	12	3368	1.13	198	10 7 6	3	M	May 4
	11	4350	3.37	189	10 3 9	5	M	March 1
	10	3693	3.96	487	10 2 11	5	M	Dec. 17, '02
	25	4565	3.18	185	10 2 1	3	M	March 9
	37	3571	4.02	479	9 19 7	5	M	Jan. 21
	12	1686	3.06	478	9 19 2	9	M	" 1
	40	3429	4.12	471	9 16 3	6	M	" 27
	21	3399	3.95	418	9 6 8	3	M	" 9
	4	3153	4.03	421	8 16 8	4	L	" 5
	29	3501	3.51	413	8 12 1	5	S	March 15
	19	4523	2.70	408	8 10 0	10	L	Jan. 15
	22	2789	4.35	401	8 8 1	1	M	March 16
	2	3217	3.63	394	8 4 2	6	S	Feb. 16
	5	3126	3.61	380	7 18 1	5	L	" 7
	33	3351	3.39	380	7 18 1	11	S	Dec. 23, '02
	15	3156	3.56	375	7 16 3	2	S	June 1
	11	3371	3.05	312	7 2 6	4	M	Feb. 13
	20	3072	3.21	325	6 16 8	16	M	Dec. 28, '02
	35	2582	3.41	291	6 2 6	5	L	Nov. 28, '02
	17	1592	4.22	224	4 13 4	6	M	Aug. 22, '02
	13	1074	4.37	157	3 5 5		M	Dec. 23, '02*
Average of	21	3314	3.60	398	8 5 10	5.55		
Per cow per day—								
Strippings		.91	8.16	2.47 lb.				
Morning milk		...	3.77	...				
Evening "		...	3.83	...				

* Sold, July 17.

W. TULLY, CALFIN, LOCHANS.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
					£ s. d.			
Cows yielding over 600 galls. milk of 3 % of fat.	34	5568	3.59	667	13 17 11	8	M	March
	26	5160	3.50	637	13 5 5	...	M	...
3 cows=5 % of the herd.	27	6279	2.97	621	12 18 9	6	L	March
Average of .	3	5769	3.33	642	13 7 6	7		
	43	4771	3.74	595	12 7 11	8	V.S.	March
	50	4574	3.81	582	12 2 6	5	M	"
	15	4354	3.93	571	11 17 11	5	M	April
Cows yielding between 500 and 600 galls. milk of 3 % of fat.	46	4729	3.52	555	11 11 8	9	L	March
	44	4242	3.87	548	11 8 4	6	M	"
	42	4736	3.11	544	11 6 8	10	S	June 14
	58	4242	3.85	514	11 6 8	...	M	...
	9	4087	3.93	535	11 2 11	10	S	March
	19	4106	3.90	531	11 2 6	7	L	Feb.
15 cows=25 % of the herd.	41	3992	3.96	527	10 19 7	6	M	March
	31	4697	3.31	517	10 15 5	6	M	April
	39	4133	3.74	516	10 15 0	3	M	May
	45	4890	3.16	516	10 15 0	11	L	March
	59	4598	3.32	510	10 12 6	...	M	...
	10	3934	3.89	510	10 12 6	3	S	May
Average of .	15	4405	3.67	540	11 5 0	6.8		
	49	4320	3.48	498	10 7 6	10	L	April
	33	4005	3.69	493	10 5 5	11	M	March
	60	3938	3.77	493	10 5 5	...	L	...
	25	4913	3.00	492	10 5 0	3	S	April
	20	4113	3.52	483	10 1 3	9	M	March
	35	4099	3.54	483	10 1 3	6	L	Feb.
	13	4501	3.21	482	10 0 10	4	M	" *
	6	4295	3.31	474	9 17 6	5	S	"
	1	4809	2.92	468	9 15 0	11	L	March
	16	4594	3.04	466	9 14 2	9	L	May 15
	24	3524	3.84	463	9 12 11	10	M	Feb.
	3	4572	3.02	460	9 11 8	6	L	March
	14	4154	3.31	458	9 10 10	10	L	April
	11	4673	2.93	457	9 10 5	12	M	"
	17	3965	3.37	446	9 5 10	8	L	Feb.
	22	3479	3.84	446	9 5 10	5	M	March
	28	4879	2.7	439	9 2 11	7	V.L.	"
Cows yielding under 500 galls. milk of 3 % of fat.	56	4157	3.14	436	9 1 8	...	L	...
	18	3311	3.92	433	9 0 5	...	M	...
	52	3759	3.31	418	8 14 2	...	M	...
	55	3399	3.51	402	8 7 6	...	M	...
	47	4262	2.74	389	8 2 1	9	V.L.	April
42 cows=70 % of the herd.	23	3426	3.40	388	8 1 8	3	S	May
	36	3034	3.80	385	8 0 5	12	M	March
	12	3315	3.46	383	7 19 7	4	M	Feb.
	8	3429	3.31	381	7 18 9	4	M	March
	4	3304	3.41	375	7 16 3	6	M	Jan.
	53	2866	3.85	368	7 13 4	...	L	...
	48	3481	3.16	367	7 12 11	5	L	April
	57	2925	3.55	346	7 4 2	...	L	...
	40	2677	3.85	343	7 2 11	10	S	April

Aborted.

W. TULLY—*continued*.

	No of cow.	Total milk in lbs.	Average % of fat	Galls. milk of 3 of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	30	3158	3.25	313	£ s. d. 7 2 11	9	L	April
	51	2923	3.45	336	7 0 0		M	
	5	2607	3.82	333	6 19 1	5	M	March
	37	3326	3.00	332	6 18 1	9	M	"
	21	3212	3.02	324	6 15 0	8	S	"
	7	2782	3.42	317	6 12 1	5	S	Feb.
	32	2974	3.52	303	6 6 3	5	M	March
	38	2220	4.07	301	6 5 5	1	M	"
	2	2343	3.80	298	6 1 2	6	M	Dec.
	29	3193	2.61	282	5 17 6	9	M	April
	51	1652	3.59	197	4 2 1		M	...
Average of	42	3585	3.34	400	8 6 8	7.02		
Per cow per day—								
Strippings	.	1.83	7.03	4 lb.				
Morning milk	.	...	3.82	...				
Evening "	.	...	3.82	...				

THOMAS WITHER, AWKIRK, LOCHANS.

Cows yielding over 600 galls. milk of 3% of fat	59	6782	3.38	767	15 19 7	8	L	April 1
	41	5703	3.50	681	13 16 8	6	M	April
Cows—10% of the herd	60	5123	3.57	612	12 15 0	5	L	June 1
Average of	3	5473	3.18	631	11 3 9	6.3		
Cows yielding between 500 and 600 galls. milk of 3% of fat.	31	4746	3.52	553	11 12 6	5	S	March
	45	4111	3.68	542	11 5 10	8	L	May
	36	4337	3.61	526	10 19 2	7	M	March
	6	1073	3.81	521	10 17 1	4	S	April
	8	4018	3.82	512	10 13 4	4	M	"
	51	1033	3.61	512	10 13 4	10	L	March
8 cows=13.11% of the herd.	26	1242	3.60	509	10 12 1	10	L	April
	12	3761	1.05	508	10 11 8	5	M	"
Average of	8	1203	3.73	523	10 17 11	6.42		
	12	1032	3.56	179	9 19 7	8	S	Feb.
	23	3539	3.91	161	9 12 1	9	S	March
	19	3301	1.01	415	9 5 5	5	S	Feb. 1
	1	1172	3.02	111	9 5 0	1	M	Feb.
	2	1102	3.22	110	9 3 1	9	S	March
	15	3632	3.63	139	9 2 11	1	M	April
	17	3279	4.00	138	9 2 6	1	S	March
	37	2996	1.36	136	9 1 8	7	L	Jan.
	52	3896	3.34	135	9 1 3	4	L	March
	16	3616	3.51	128	8 18 4	3	S	May
	56	2850	4.47	125	8 17 1	4	S	March
	21	3576	3.51	123	8 16 3	8	M	"
	11	3921	3.21	122	8 15 10	4	S	April
	38	3707	3.89	119	8 14 7	9	L	Feb.
	49	3455	3.64	119	8 11 7	4	M	April
	5	3566	3.52	119	8 11 7	4	S	March

THOMAS WITHER—continued.

	No. of cow.	Total milk in lbs.	Average % of fat.	Galls. milk of 3 % of fat.	Value of produce at 5d. per gall.	Age of cow.	Size of cow.	Date of last calving.
	57	3268	3.80	415	£ s. d. 8 12 11	6	S	Feb.
	34	3741	3.82	411	8 12 6	7	M	"
	55	3162	3.96	413	8 12 1	3	S	May
	61	3472	3.49	404	8 8 4	10	M	April
	43	3193	3.77	402	8 7 6	6	M	May
Cows yielding	33	3791	3.18	402	8 7 6	5	S	April
under 500	14	3287	3.66	401	8 7 1	4	M	"
galls. milk of	35	3046	3.82	388	8 1 8	6	M	Feb.
3 % of fat.	50	2920	3.94	384	8 0 0	6	M	March
	40	3340	3.44	383	7 19 7	7	L	Feb.
50 cows=81.96 %	39	3269	3.50	382	7 19 2	11	M	"
of the herd.	10	2666	4.24	377	7 17 1	5	M	April
	20	2783	4.06	377	7 17 1	6	M	March
	18	3023	3.72	375	7 16 3	10	M	Dec. 1902
	44	3260	3.44	374	7 15 10	6	M	March
	29	3485	3.22	374	7 15 10	12	M	April
	3	3305	3.31	364	7 11 8	5	M	Jan.
	28	3151	3.45	362	7 10 10	5	S	March
	47	2678	4.05	361	7 10 5	3	L	April
	54	3125	3.32	346	7 4 2	7	M	Feb.
	25	2678	3.87	345	7 3 9	4	S	April
	32	3549	2.83	335	6 19 7	8	S	Feb.
	9	2744	3.62	332	6 18 4	2	S	April
	7	2493	3.86	321	6 13 9	6	S	March
	24	2244	4.26	319	6 12 11	6	S	April
	53	2901	3.29	319	6 12 11	10	S	Jan.
	46	3098	3.06	316	6 11 8	10	L	Feb.
	1	3384	2.78	314	6 10 10	9	M	March
	19	2628	3.48	305	6 7 1	10	M	Jan.
	22	2451	3.71	303	6 6 3	6	S	March
	13	2370	3.43	275	5 14 7	6	M	"
	30	1883	4.07	256	5 6 8	8	M	Feb.
	27	2064	3.00	207	4 6 3	7	S	March
	58	1008	4.01	135	2 16 3	8	M	April
Average of	50	3118	3.57	375	7 16 3	6.4		
Per cow per day—								
Strippings	.	1.8	7.01	4.2 lb.				
Morning milk	.	...	3.95	...				
Evening "	.	...	4.23	..				

MILK RECORDS—SUMMARY OF THE YIELD OF EACH HERD FOR 26 WEEKS

	Cows yielding under 200 gals of milk, of 3 of fat				Cows yielding between 200 and 300 gals, of milk of 3 of fat				Cows yielding over 300 gals of milk				Average value of 100 lbs of the whole milk
	No of cows	No of the herd	Average of fat	Value of produce per cow at ad per gall	No of cows	Average of fat	Value of produce per cow at ad per gall	No of cows	Average of fat	Value of produce per cow at ad per gall	No of cows	Average of fat	
Turnberry	18	33	3.6	309	8	3.72	330	8	18	40	3.67	689	11 12 9
Knoekdon	12	25	3.62	4.0	20	4.44	3.63	3.0	13	28	3.83	670	11 13 4
Finchrie	9	37	3.4	4.30	8	3.33	3.37	3.86	7	29	3.6	714	11 15 4
Whiteside	7	20	3.7	4.37	10	3.3	3.7	3.61	23	60	3.7	688	11 15 3
Orangefield	6	37	3.69	3.82	13	4.16	3.6	3.41	4	16	3.6	643	10 19 7
Lees-sock	20	70	3.7	4.34	4	2.10	4.13	3.59	6	37	3.88	491	11 19 4
W. Quitts-ton	8	40	3.74	4.05	10	3.79	3.7	3.48	5	12	3.9	664	11 19 11
Barrhill	20	60	3.5	3.83	8	4.00	3.67	3.63	4	20	3.8	67	10 10 0
Broadwood	16	69	3.7	4.08	7	2.3	3.5	3.30	3	10	3.5	6.4	10 17 11
Aitkenbrae	16	76	3.4	3.77	7	3.04	3.7	3.57	3	10	3.5	6.4	9 9 0
Total	182				105				83				21 8 13 4
Average	43	371			32	3.67			29	3.73			20

DUMFRIES.—SUMMARY OF THE YIELD OF EACH HERD FOR 26 WEEKS.

	'Cows yielding under 500 galls of milk of 3 of fat.					Cows yielding between 500 and 600 galls. of milk of 3 of fat.					Cows yielding over 600 galls. of milk of 3 of fat.					Total number of cows reported on	Average value of produce of the whole herd per cow
	No. of cows.	No. of the herd	Average of fat	Value of produce per cow at 5d per gall.	£ s. d.	No. of cows.	No. of the herd.	Average of fat.	Value of produce per cow at 5d per gall.	£ s. d.	No. of cows.	No. of the herd.	Average of fat.	Value of produce per cow at 5d. per gall.			
<i>Sungher</i> —																	
Gate-side	9	23-7	3-79	410	8 10 10	11	29-0	3-56	541	11 5 5	13	47-3	3-80	727	15 2 11	38	12 9 2
Tower	15	34-4	3-55	402	8 7 1	11	34-4	3-72	539	11 4 7	6	13-7	3-63	659	13 15 0	32	10 7 1
Whitehill	7	23-4	3-72	425	8 17 1	10	33-3	3-51	533	11 2 1	13	43-3	3-63	694	14 9 2	30	12 0 10
<i>Thornhill</i> —																	
Shawmuir	..	34-8	3-83	423	8 16 3	16	48-5	3-66	561	11 13 9	17	51-5	3-72	726	15 2 6	33	13 9 2
Croftjane	8	17-7	4-12	447	9 6 3	12	52-5	3-80	545	11 7 1	3	13-0	3-88	644	13 8 4	23	10 14 7
Drum	3	..	..	..	..	4	23-5	3-72	577	12 0 5	10	58-8	3-72	664	18 16 8	17	12 12 6
<i>Dunfries</i> —																	
Muirside	24	54-5	3-71	438	9 0 5	13	29-6	3-65	543	11 6 3	7	13-9	3-74	629	13 2 1	44	10 6 3
Tunwaldshaw.	17	37-7	3-76	434	9 0 10	20	44-4	3-57	531	11 1 3	8	17-8	3-66	647	13 9 7	45	10 14 7
Roucan	24	51-0	3-67	432	9 0 0	14	30-0	3-69	549	11 8 9	9	19-0	3-77	668	13 18 4	47	10 13 4
Banks	13	42-0	3-55	405	8 8 9	9	29-0	3-59	550	11 9 2	9	29-0	3-50	660	13 15 0	31	10 17 6
Boghead	18	78-3	3-76	403	8 7 11	3	13-0	3-57	545	11 7 1	2	5-7	3-59	660	13 15 0	23	9 5 0
Total	188	..	..	..	..	123	..	..	..	..	102	..	..	..	..	363	..
Average	..	38-0	3-59	..	..	..	33-9	3-64	..	..	..	28-1	3-69	..	..	..	..

WIGTOWNSHIRE.—SUMMARY OF THE YIELD OF EACH HERD FOR 26 WEEKS.

	Cows yielding under 500 galls. of milk of ; of fat.				Cows yielding from 500 and 600 galls. of milk of 3 of fat.				Cows yielding over 600 galls. of milk of 3 of fat.				Total number of cows reported on.	Average value of produce of the whole herd per cow.			
	No. of cows	Average of the herd.	Value of produce per cow at 5d. per gall.	Gals. milk of 3 of fat.	Average of the herd.	Value of produce per cow at 5d. per gall.	Gals. milk of 3 of fat.	Average of the herd.	Value of produce per cow at 5d. per gall.	Gals. milk of 3 of fat.	Average of the herd.	Value of produce per cow at 5d. per gall.					
Inchparks	21	48.3	3.60	398	8 5 10	2	44.1	3.55	535	11 2 11	2	6.9	3.84	654	13 12 6	2	9 18 4
Chlenry	48	40.00	3.50	383	7 19 7	11	18.3	3.71	546	11 7 6	1	1.68	3.71	629	13 2 1	1	8 13 9
Dunraght	43	74.1	3.52	421	8 15 5	14	24.1	3.68	536	11 3 4	1	1.72	4.28	606	12 12 6	6	9 8 4
Freugh	84	56.6	3.59	424	8 16 8	19	31.6	3.57	542	11 5 10	7	11.6	3.63	652	13 11 8	5	10 3 4
Greyhill	25	45.07	3.64	404	8 8 4	21	40.3	3.7	546	11 7 6	6	11.5	3.74	683	14 4 7	9	10 5 9
Kildonnan	26	52.40	3.54	408	8 10 0	18	36.00	3.62	539	11 4 7	6	12.00	3.59	691	14 7 11	5	10 5 9
Awkirk	50	51.46	3.57	375	7 16 3	8	13.11	3.73	523	10 17 11	3	4.91	3.48	681	14 9 9	6	10 5 5
Colfin	26	40.00	3.84	400	8 6 8	15	25.00	3.67	540	11 5 0	3	5	3.38	642	13 7 6	3	9 6 3
Kilhill	26	48.2	3.9	423	8 13 4	25	46.3	3.8	537	11 3 9	3	5.5	3.8	653	13 12 1	5	10 4 6
Challoch	37	61.46	3.66	423	8 16 3	14	23.3	3.71	540	11 5 0	9	15.00	3.88	651	13 11 3	6	10 1 8
Merslaugh	48	94.11	3.7	340	7 13 4	3	5.88	4.1	544	11 6 8	3	7.69	4.13	617	12 17 1	5	8 2 6
Arduell	32	82.05	3.6	346	7 4 2	4	10.35	3.82	563	11 1 7	3	7.69	4.13	617	12 17 1	5	8 2 6
Total	482	...	...	...	...	171	...	...	...	...	45	...	...	...	...	648	...
Average	...	46.46	3.58	...	...	...	26.77	3.69	...	...	...	7.58	3.77	...	...	...	...

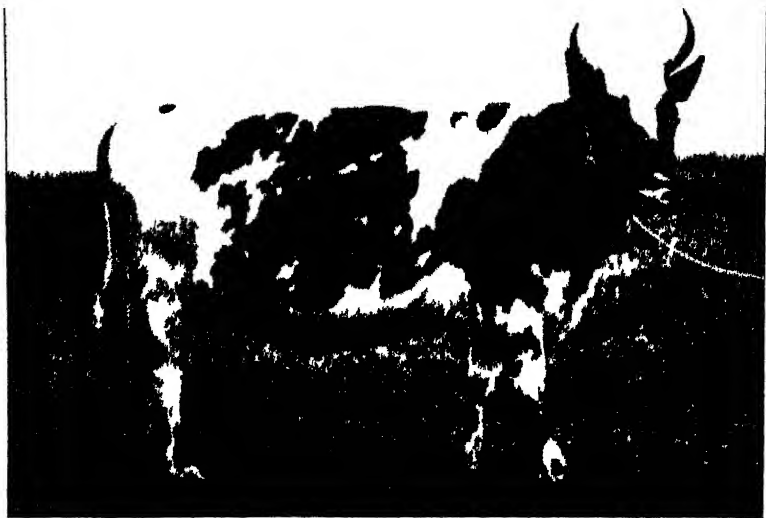


Fig. 18—AYRSHIRE COW, "LILY OF SHAWMUIR"

Bred by and the property of Mr W Sloan, Shawmuir, Thornhill, Dumfriesshire. Aged four years. Entered in Appendix of vol 24 of Ayrshire Herd Book. Sire Collingwood 3565. This cow gave the best yield of milk in Milk Record trials of 1903—viz 190 gallons of milk of 8 per cent fat for a period of six months, representing at 5d per gallon a sum of £20, 9s. 4d (See pp 175 and 201)



Fig. 19—AYRSHIRE COW, "ROSH III 11, 56"

Bred by and the property of Mr James Moffat, Gateside, Sanquhar, Dumfriesshire. Calved April 1905. Descended on the female side from a family that have been in the Gateside dairy for about seventy years. This cow gave the second high yield in the Milk Record trials of 1903—viz 932 gallons of milk of 8 per cent fat for a period of six months, representing at 5d per gallon a sum of £19, 16s. 5d (See pp 175 and 202)



Fig 20—AYRSHIRE COW

The property of Mr James Wylie, Whitehill, Sanguhar, Dumfriesshire. Pedigree unknown. This cow gave the third highest yield in the Milk Record Trials of 1907—viz., 906 gallons of milk of 3 per cent fat in a period of six months, representing, at 5d per gallon a sum of £17 7s 1d (See pp 175 and 208.)

THE MULTIPLE ORIGIN OF HORSES AND PONIES.

By J. COSSAR EWART, M.D., F.R.S., University of Edinburgh.

HITHERTO it has been generally assumed that wild horses have been long extinct, that all domestic horses are the descendants of a single wild species, and that, except in size, ponies in no essential points differ from horses.

Now that systematic attempts are being made to improve native breeds of horses in various parts of the world, it is obviously desirable to settle once for all whether, as is alleged, occidental as well as oriental and African races and breeds have sprung from the same wild progenitors, and more especially if *all* ponies are merely dwarf specimens of one or more of the recognised domestic breeds. Those concerned with the improvement of indigenous races and breeds—acting on the assumption that horses, light as well as heavy, had, like cattle, a single origin, that but for differences in the environment all the unimproved races would be practically identical—have hitherto, with rare exceptions, resorted to intercrossing. Intercrossing, as recent inquiries have clearly demonstrated, leads to very different results. When unaccompanied by artificial selection it generally leads to the appearance of new varieties, which if they happen to be adapted to the surroundings or environment persist and produce yet other varieties. When accompanied by artificial as well as natural selection, intercrossing may result (1) in the aboriginal race being completely supplanted by a new and alien race, (2) in the rejuvenation and improvement of the original race without the loss of any of its distinctive characters, or (3) in the formation of a new breed in which the characters of the original and alien races are more or less perfectly blended.

In the case of moor and mountain ponies the plan hitherto frequently followed has consisted in introducing Arab, thoroughbred, or other alien stallions, and leaving the rest to nature. The result of this method has either been the all but complete destruction of the native race it was sought to improve, or, at least at the outset, a decided loss of the vigour, hardiness, and other traits which adapted the indigenous race for its immediate surroundings. In some cases the breeder, in his desire to have increased size, more quality, or higher action, has rendered effective assistance in the process of extinction. Instances of this we have in the loss of the once famous Three ponies, and the even more famous Galloways of the south-west

of Scotland. If all horses have descended from the same wild progenitors, and if the difference between a cart-horse and a high-caste Arab is mainly due to differences in the respective environments, the improvement of native breeds by the provision of Arab, hackney, and other sires, without any serious attempt at selection, may be regarded as in every way appropriate. But if, as is probable, horses, like dogs, have had a multiple origin—have sprung from several wild species evolved, it may be, in widely separated areas—and more especially if in isolated and outlying areas fairly typical representatives of some of the remote wild ancestors still survive, it is conceivable that in future very different methods will be followed for improving the native races from those hitherto commonly adopted—that, *e.g.*, it may be possible to improve the quality or add to the size and substance without the help of highly specialised artificial alien breeds devoid alike of the hardiness and the intelligence so essential for a semi-wild life. To be in a position to arrive at a conclusion as to the origin of the various kinds of domestic horses, and at the same time find an answer to the important and oft-repeated question, What is a pony? one must clear up as far as possible the later chapters in the history of that section of the Equidæ to which the true horses belong.

It is generally admitted that the ancestors of the living Equidæ reached the Old World from the New, the later immigrants crossing by land bridges in the vicinity of Behring Straits. If horses came originally from the New World, to the New World we may first turn for information as to their remote progenitors.

According to recent inquiries, North America possessed in pre-glacial times at least nine perfectly distinct wild species of Equidæ. Some of these were of a considerable size—*e.g.*, *Equus complicatus* of the southern and middle western States and *E. occidentalis* of California were as large as a small cart-horse. Others were intermediate in size—*e.g.*, *E. fraternis* of the south-eastern States; and at least one—*E. tau* of Mexico—was extremely small. Some of the American pre-glacial Equidæ were characterised by very large heads and short strong limbs, some by small heads and slender limbs; and though the majority conformed to the true horse type, two or three were constructed on the lines of asses and zebras.

When true horses first made their appearance in America the climate and the land connections between the Old World and the New were very different from what they are to-day. One result of these differences was that before the close of the Pliocene period—*i.e.*, prior to the Great Ice Age—it was possible for American horses to find their way into Asia and thence

into Europe and Africa. One of the earlier immigrants (*Equus stenonis*) has left its remains in the pliocene deposits of Britain,¹ France, Switzerland, Italy, and the north of Africa. While *E. stenonis* was extending its range into Europe and Africa, two others (*E. sivalensis* and *E. namadicus*) were finding their way into India, and yet other species were doubtless settling in Eastern Europe and Central Asia.

It may hence be safely assumed that as Africa now contains several species of zebras, Europe at the beginning of the Pleistocene period was inhabited by several species of horses.

We know that before the beginning of the historic age horses had become extinct in North America, but we have not yet ascertained what was the fate of the equine species which reached, or were evolved in, the Old World before or during the Great Ice Age. It is believed by some palæontologists that the Indian species, *E. sivalensis* and *E. namadicus*, became extinct, and that *E. stenonis* gave rise through one variety (*E. robustus*) to the modern domestic breeds, and by another (*E. ligeris*) to the Burchell group of zebras. *E. sivalensis*, unlike *E. stenonis*, but like the still earlier three-toed horse *Hipparion* and certain prehistoric South American species, was characterised by a depression in front of the orbit for a facial gland (probably similar to the scent-gland of the stag), and usually by large first premolar (wolf) teeth in the upper jaw. In some recent horses having Eastern blood in their veins there seems to be a vestige of the pre-orbital depression, and in some of the horses of south-eastern Asia (e.g., Java and Sulu² ponies), as in some zebras (e.g., Grevy's zebra and a zebra of the Burchell type found near Lake Baringo), there are large functional first premolars. It is hence possible that lineal but somewhat modified descendants of *E. sivalensis* of the Indian Pliocene may still survive, and that *E. sivalensis* was a lineal descendant of *Hipparion*.

We are, however, more concerned with the ancestors of the domestic horses of Europe and North Africa than with oriental horses.

From osseous remains already found we know horses were widely distributed over Europe during the Pleistocene period, and that they were especially abundant in the south of France in post-glacial times. It has not yet, however, been determined how many species of horses inhabited Europe during

¹ *E. stenonis* or an allied species probably also occurred in pre-glacial times in Ireland.

² In the Sulu ponies the condyles by which the skull is connected to the vertebral column are, as in *Hipparion*, but unlike the common horse of Europe, almost in contact with each other. The functional first premolars, the intimate relation of the occipital condyles (together with the large size of the canines), may be said to point to some of the oriental horses having a different origin from our occidental breeds.

and immediately after the Ice Age, nor yet to which of the pre-glacial species prehistoric horses were genetically related. Bones and teeth from deposits and caves in the south of England seem to indicate that during the Pleistocene period several species of horses ranged over the west of Europe. The Pleistocene beds of Essex have yielded bones and teeth of a large-headed, heavily built horse, which probably sometimes measured over 14 hands (56 inches) at the withers. From the "elephant bed" at Brighton portions of a slender-limbed horse have been recovered; and Kent's cave, near Torquay, has yielded numerous fragments of two varieties or species which differed somewhat from the Essex and Brighton species. The "elephant-bed" horse has hitherto been described as very small; but if one is to judge by the bones in the British Museum it may very well have reached a height of 50 or even 52 inches (12·2 or 13 hands). The Kent's cave horses were probably from 13 to 14 hands high. One in its build approached the Essex horse, the other the slender-limbed species of the "elephant bed" at Brighton. If there were two or more species in Pleistocene times in the south of England (then part of the Continent), it is probable that yet other species inhabited south and middle Europe and the north of Africa.

As already mentioned, horses were extremely abundant in the south of France in the not very remote post-glacial period.¹ Evidence of the existence of large herds we have at Solutré, where for a number of years there was an open-air Palæolithic encampment. The men of the Early Stone Age devoted themselves almost exclusively to hunting. With their rude stone and bone implements they succeeded in killing the elephant, horse, stag, reindeer, ox, and other ungulates; the bear, wolf, hyæna, and other carnivores. Near the Solutré encampment (which lies in the vicinity of the Saône, about midway between Chalons and Lyons), the bones of horses² and other beasts of the chase were sufficiently abundant to form a sort of rampart around part of the settlement. It is difficult to say how many species of horses are represented at Solutré; but there seems no doubt that the majority belonged to a stout, long-headed, but short-limbed animal, measuring about 54 inches (13·2 hands) at the withers. Though of smaller size, the typical Solutré horse had nearly as large joints and hoofs as the Essex Pleistocene species. Like the Essex horse, it seems to have been specially adapted for living in low-lying marshy ground in the vicinity

¹ An account of the Prehistoric Horses of Europe, by Dr Robert Munro, will be found in the 'Archæological Journal,' vol. lix. No. 231.

² Toussaint of the Lyons Veterinary College believes that at Solutré there were fragments of at least 100,000 horses, all of which had been used as food.

of forests, and for feeding during part of the year on coarse grasses, shrubs, roots, and other hard substances, for the crushing of which large teeth set in long powerful jaws were indispensable.



Fig. 21.—Horse with a long head, from an engraving in the cave of La Mouthe.

(Munro's 'Prehistoric Horses'.)

That horses of the "elephant-bed" type have not been described from the Solutré bone-mounds may be due to the fact that the slender-limbed fleet varieties frequented open plains or high plateaus, where, in the absence during the Early Stone Age of dogs and weapons of precision, their capture was well-nigh impossible. That lightly built as well as stout species existed in post-glacial as in Pleistocene times is made evident by bones found in caves and by

drawings and sculptures made by Palæolithic hunters. Of the existence of two kinds of horses in post-glacial times, practically identical with the stout and slender-limbed Pleistocene species,

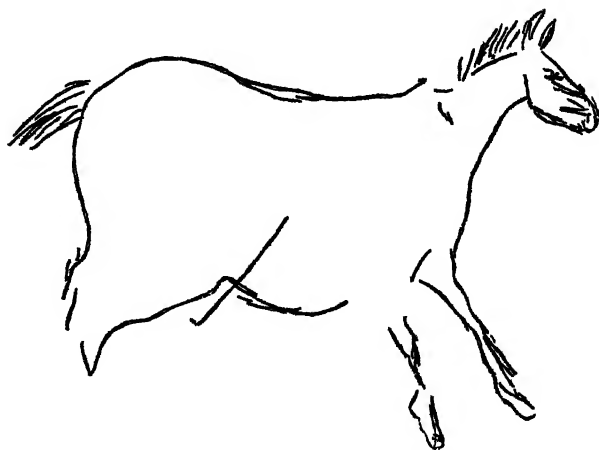


Fig. 22.—Horse with a small head, from an engraving in the cave of La Mouthe.

(Munro's 'Prehistoric Horses'.)

the cave of Reilhac, near Lyons, is especially eloquent. It is, however, mainly by the engravings on the walls of caves in the Dordogne, Gard, and other districts in the south of France that

the existence in late Palæolithic times of various kinds of light and heavy species of horses is made manifest.

In the cave of La Mouthe, *e.g.*, two horses are incised on the same panel—perhaps by the same hand,—one of which (fig. 21) has a very long head attached nearly at right angles to a short thick neck, while the other (fig. 22) has a small head, Arab-like ears, and a long slender neck such as we are wont to associate with racehorses.

In the Combarelles cave (Commune of Tayac), the walls of which for over a hundred yards are crowded with animal fig-

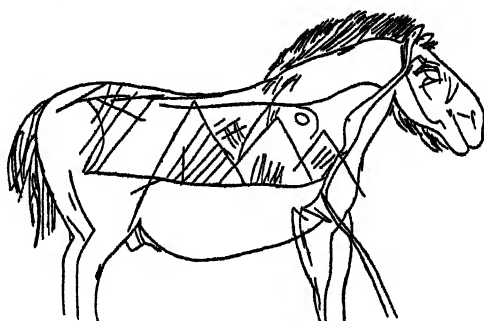


Fig. 23.—Engraving of a heavily built horse, from the Combarelles cave (1^b).

(Munro's 'Prehistoric Horses'.)

ures, there are, in addition to twenty-three nearly full-sized engravings of horses, numerous studies of equine heads. Some of the Combarelles horses decidedly differ from those of La Mouthe. There is, *e.g.*, a large drawing of a heavily built horse (fig. 23) with a coarse head, an arched muzzle, a thick under lip, rounded quarters, and a tail with long hair up to the root. At another part of the cave there is what appears to be a natural-size engraving (fig. 24) of a head which in outline is wonderfully suggestive of an Arab—in this as in other cases some dark substance had been rubbed in to make the incisions in the living rock more conspicuous; and at yet another part of the cave a horse (fig. 25) with a pony-like head is represented, behind which stands an animal with a head like that of a modern Shire horse.

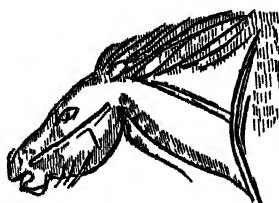


Fig. 24.—Head of a horse with a profile like that of an Arab, from the Combarelles cave (h).

(Munro's 'Prehistoric Horses'.)

In addition to the types figured on the walls of caves there

are others carved on pieces of horn and other durable substances. The majority of the horses engraved on horn are characterised by a very large coarse head (fig. 26), but a few (*c.g.*, the horse (fig. 27) from the Kesserloch cave near Schaffhausen) are remarkable for the small size of the head, the fine muzzle, and small ears. When some years ago the lifelike engraving of a reindeer on a piece of horn was found in the Kesserloch cave, and almost equally striking engravings of the mammoth and bison and of several antelopes were discovered on the walls of the Dordogne caves, it was difficult to believe they belonged to prehistoric times. Now, however, it is admitted that the troglodytes of the Cro-Magnon race were most accurate ob-

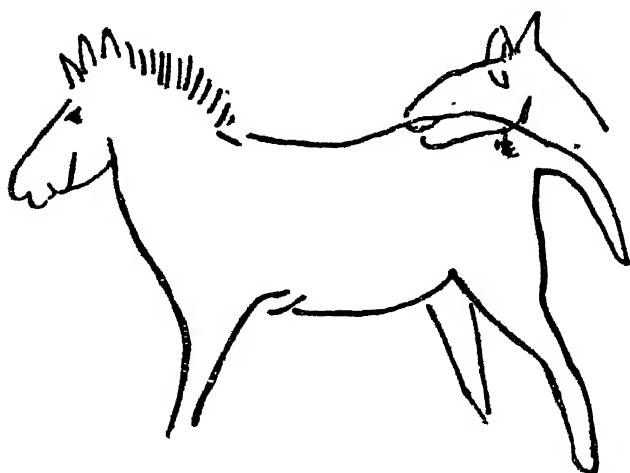


Fig. 25.— *Sketch of a horse with a small head and a straight profile, above which is the head of a Roman-nosed long-headed animal.*

(Combarel's cave, Capitan and Breuil.)

servers, and in many ways better able than any succeeding occidental race to make faithful graphic records of the facts observed. Hence, while bearing in mind that some of the Palæolithic engravings are more or less conventional and sometimes obviously the work of beginners, they must on the whole be regarded as extremely valuable records of the animals which frequented the south of Europe during the Early Stone Age.

As already indicated, the men of the Early Stone Age have left us drawings of some four or five different kinds of horses, —some with large heads and stout limbs, some with fine heads and slender limbs, some with a nearly straight croup and a well-set-on tail, others with rounded quarters and the root of the tail far below the level of the croup. Drawings made at

the present day will be of little use some centuries hence in providing an answer to the question, How many species of horses existed in Europe at the beginning of the twentieth century? They will confuse rather than enlighten future inquirers, because for several generations breeders of horses, like breeders of cattle, dogs, &c., have with the help of selection and isolation succeeded in creating numerous artificial strains. Is there any reason for supposing the evidence afforded by the prehistoric drawings is more valuable to us than recent drawings will be to our successors thousands of years hence, should they desire to ascertain how many species of horses Britons possessed at the end of the nineteenth century? That depends on whether in Palæolithic times the horse was domesticated in Europe. MM. Capitan and Breuil and other distinguished anthropologists believe the horse was under domestication in Europe during the Early Stone Age, but Pietrement and others, equally distinguished, believe the art of domestication was first introduced into Europe during the Late Stone Age.

The head in fig. 24 looks as if it was provided with a halter, while the horse represented in fig. 23 seems to be carrying a

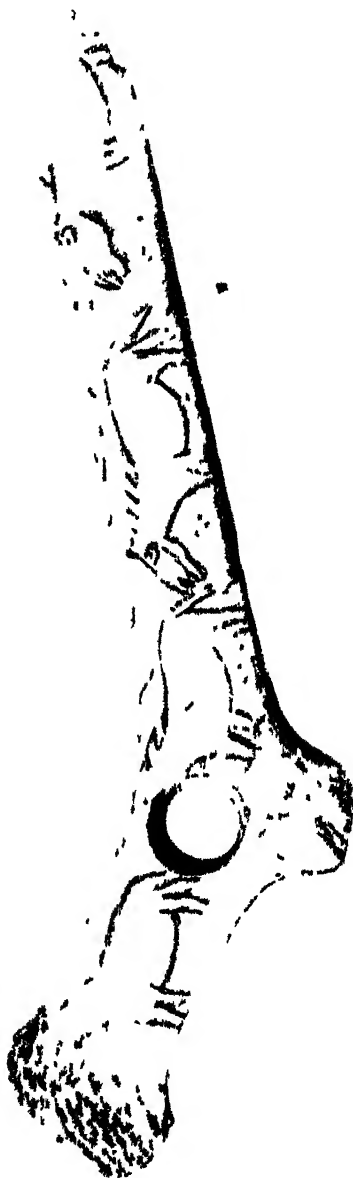


Fig. 26.—A row of large heavy headed horses engraved on a piece of reindeer-horn.

(Munro's 'Prehistoric Horses'.)

haunch of venison, and in another drawing it is said a line of horses is represented "dressed" (according to one interpretation) as accurately as "the front rank of a squadron." How came the Palæolithic artist-hunter to represent horses haltered, playing the part of pack-animals, and, as has been alleged, arranged as accurately as the front rank of a squadron,¹ if domesticated horses were unheard of until the coming of the Neoliths?

It is extremely probable the men of the Early Stone Age had now and again tame horses, just as nowadays we have at times tame zebras, but it is most unlikely that they had herds of horses which they systematically bred and reared as stockmen now breed and rear cattle.

Quite young foals seem to have only two very strong instincts: one is to suck anything they can get between their lips, the other is to follow a moving object. So strong is the second



Fig. 27.—Engraving of a small-headed horse on a piece of reindeer-horn, from the Kesslerloch cave near Schaffhausen.

(Munro's 'Prehistoric Horses')

instinct that a foal will often leave its dam and trot quite contentedly after whatever happens to be moving in its vicinity. During hunting expeditions in prehistoric as in recent times the mothers of very young foals would sometimes be slaughtered, and as likely as not the foals would occasionally attach themselves to the hunters, and in course of time become quite tame. Out of the twelve young wild horses (*E. c. przewalskii*) which reached Woburn in 1902 from the Great Altai Mountains one was perfectly tame, and still leaves its companions to be noticed whenever any one visits the paddocks. In the same way, out of the four zebras I have had, one, a yearling filly, was as tame, and on account of its tameness as troublesome, as a pet lamb. It is possible the Palæolithic hunters now and again utilised tame horses to carry the spoils of the chase from the distant

¹ I have not seen a drawing showing a long line of horses dressed as accurately as "the front rank of a squadron," but in fig. 28 we may have parts of an advancing troop (herd) of horses.

hunting-grounds, as Highland ponies now carry stags from the distant forest.

There are good reasons for believing that the prehistoric huntsman was in the habit of removing, at or near the root, the tail of the horses slaughtered. As he was unacquainted with the art of weaving, it is possible the hair thus obtained was used (as is still the case in Arabia and the west of Ireland) for the making of ropes—ropes for halters, and for assisting the troglodyte in subduing a wild (perhaps partly disabled) horse when one was needed to carry the spoil to his rock-shelter.

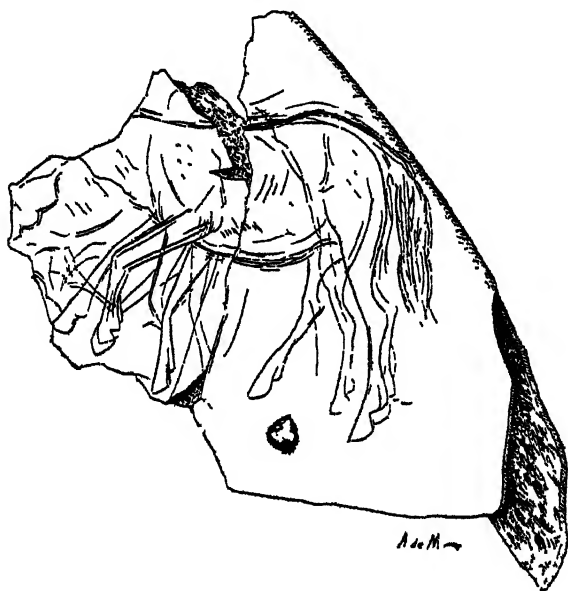


Fig. 28.--Engraving showing horses which might perhaps be described as forming part of the front rank of a squadron.

Note that the limbs are slender, the joints small, and that the tail is provided with long hairs right up to the root.

The existence of an engraving showing a long line of horses as accurately "dressed" as the front rank of a squadron would not necessarily support the view that the Paleoliths were skilled horse-trainers, for both plain and striped, wild and tame, horses frequently advance in column. When alarmed, or when an absent member of the herd returns, horses often gallop to some coign of vantage from which they can ascertain where danger lies or see their returning comrade. When they reach the crest of a ridge they often stand for a few minutes, "dressed" as accurately as the front rank of a squadron, before

taking flight or advancing in open order to fraternise with their errant companion.

The men of the Early Stone Age may have had tame horses, and they may have been intelligent enough when circumstances demanded to bring wild horses rapidly under control, but there is no evidence that they either bred or reared horses, and it was not until a very much later period that new breeds were formed by artificial selection. That the domestication of the horse as now understood was not attempted in Palæolithic times may be inferred from the fact that the majority of the horses in the Solutré bone-mounds were from five to seven years old. This means that it was chiefly the vigorous defenders of wild herds—not immature or aged individuals—which furnished food for the Solutré settlement. Had horses been bred for food as we nowadays breed cattle, young individuals would have been most abundant at Solutré.

If it is admitted that the engravings on the walls of caves and on pieces of horn fairly accurately represent animals which actually existed at the end of the Ice Age, and if it is also admitted that the creation of new varieties by artificial selection was never attempted until at the earliest the arrival of the Neoliths, it follows that in post-glacial as in Pleistocene times there were several perfectly distinct wild species of horses in Europe.

By way of further criticism it might be said that as two wild species are rarely evolved in the same area at the same time, it is inconceivable that three or four perfectly distinct kinds of horses once occupied a comparatively small area in the south of France. In reply it may be pointed out that though several species occur in the same small area, it by no means follows they were evolved in that area. In Scotland, *e.g.*, we sometimes find the brown and the variable hare occupying the same ground, but the one reached us with the Siberian, the other with the Arctic, fauna.

During the Pleistocene period the elephant, hippopotamus, lion, leopard, hyæna, and other southern forms sometimes occurred as far north as Britain; at another time the Arctic fox, glutton, musk-ox, reindeer, mammoth, and other northern forms inhabited the south of Europe. The marked changes in the climate during and immediately after the Ice Age are sufficient to account for these and other anomalies in distribution.

Even in post-glacial times the climate was cold and uncongenial in the south of France—so cold that the Palæolithic hunters could safely allow heaps of bones and other refuse to accumulate on the floors of the caves in which they lived.

While warm periods prevailed southern forms from North Africa—then connected to Europe by land bridges—and from

Southern Asia migrated northwards; during the cold periods they were forced southwards, followed or accompanied by northern and temperate species. It is hence conceivable that for centuries there were crowded into a comparatively small area in the south of Europe not only occidental species of horses but also species from Africa, Central Asia, and the southern slopes of the Himalayas. Eventually the last cold phase came to an end, with the result that the Arctic forms retreated to the north, while the southern forms either died off or wandered eastwards never to return, thus leaving the greater part of Europe in the possession of temperate species, the majority of which still survive.

The question now arises, What became of the various kinds of wild horses which it is presumed occupied the south of Europe at the close of the post-glacial period? It is possible that they all became extinct, or that as the climate changed the majority dispersed—some in a south-easterly direction, some towards their old home in Central Asia, while others took possession of the accessible parts of middle and north-western Europe, their progress depending partly on their rate of increase and partly on the rate at which the amelioration of the climate took place.

There is yet another possibility. As the climate improved there came out of the East a new race of men who, though, like the Palæoliths, only armed with stone and bone implements, built for themselves houses, grew corn and fruits, reared domestic animals, and had some skill in weaving and in the making of pottery. These immigrants from Asia—the Neoliths or men of the New Stone Age of anthropologists—possessed, amongst other domestic animals, the ox, sheep, and goat, the pig, dog, and horse. For some reason or other it has hitherto been very commonly assumed that, as in recent times the wild striped horses of South Africa—the quagga and zebras—have been gradually supplanted by occidental or oriental domesticated horses, the wild horses of Europe were gradually displaced by domesticated varieties introduced by the Neoliths. It seems to me quite unnecessary to assume that the indigenous varieties so long familiar to the Palæolithic inhabitants were exterminated. It is far more likely that the men capable of covering the walls of their caves with lifelike engravings of animals would realise soon after the arrival of the Neoliths that by capturing wild horses they would be in a position to trade with the new-comers—to barter horses for cloth, or implements, or grain, as the African now barter with Arabs and other recent invaders of the Dark Continent.

It is also more than probable that the Neoliths, like their mixed descendants who at a subsequent period occupied the

New World, would sometimes capture wild horses on their own account. There are excellent reasons for believing the Neoliths domesticated the urus—the huge wild ox met with in later times by the Romans in the Hercynian forest. If they reduced to subjection a wild ox which sometimes reached a height of seven feet (over 20 hands), they would have little difficulty in taming horses from 13 to 14 hands, which were perhaps as easily brought under control as our semi-wild moorland ponies. Hence the advent of the Neoliths, instead of implying the extermination of indigenous varieties, in all probability meant the introduction of yet other varieties.

As it happens, we know surprisingly little about the horses of Europe between the end of the Palæolithic and the beginning of the historic age. The information thus far accumulated seems to indicate that in early Neolithic times domesticated horses were extremely rare in some parts of Europe and altogether absent in others. It is said, *e.g.*, that the inhabitants of the earliest Swiss lake-dwellings had no horses; "that the horse was very rare, if not altogether unknown, in England during the Stone Age," and that it only reached Scandinavia towards the end of the Neolithic period. The absence of bones and teeth of the horse from Swiss lake-dwellings, from English barrows and Danish refuse-heaps belonging to the Neolithic period, does not, of course, prove that wild horses did not exist in middle and north-west Europe during the Late Stone Age. The common elk and the extinct gigantic Irish elk, the stag and reindeer, the huge urus and the Celtic shorthorn, all found their way into Britain in prehistoric times. It may hence be regarded as extremely probable that in Neolithic as in Pleistocene times Britain possessed several species of wild horses. It need only be further stated that horses were abundant throughout the greater part of Europe during the Bronze Age, and that in the Bronze as in the Stone Age there were at least two perfectly distinct kinds of indigenous varieties or species.

The horse has played an important part during the historic period, but the records—written and pictorial—hardly admit of decided conclusions being arrived at as to how many species and varieties were represented amongst the horses of either the ancient Egyptians, Greeks, or Romans. Partly for this reason, but mainly because Professor Ridgeway of Cambridge is about to publish an important work on 'The Origin and Influence of the Thoroughbred Horse,' I shall at once proceed to refer to some of the more striking kinds of horses met with at the present day.

I may here repeat that now, as throughout the nineteenth century, it is generally assumed that all the domestic breeds,—

small as well as large—have sprung from a single wild species. I should perhaps add that this has long been the opinion of many distinguished zoologists, as well as of hippologists and breeders. The great French naturalist Cuvier not only believed that all living horses belonged to one species (the *Equus caballus* of Linnæus), but that there was no specific difference between living breeds and the fossil horses of the Pleistocene period. Professor Sanson of the French National College of Agriculture, in his 'Traité de Zootechnie' (1901), assuming a single origin for domestic breeds, divides recent horses into two groups,—a long-headed and a short-headed group,—each of which consists of several races; while Captain Hayes, in his recently published 'Points of the Horse' (1904), says "no breed of horses possesses any distinctive characteristic which serves to distinguish it from other breeds," and adds that "as a rule locality . . . and artificial selection are the chief factors in the formation of breeds." Elsewhere Captain Hayes states, "As far as I can learn, no attempt has been made to separate ponies from horses except on the purely artificial basis of height."¹ On the other hand, Captain Hayes admits I may be right in believing "that two or more separate equine varieties may exist in the same breed." This seems to me tantamount to admitting the multiple origin of the horse. Even those who are prepared to admit that recent horses may have sprung from several wild species, allege that owing to domestication, intercrossing, and artificial selection it is no longer possible to indicate the distinguishing characters of the two or more wild species which took part in forming the present races and breeds.

THE WILD HORSE

(*Equus caballus przewalskii*).

The wild horse may be first considered. For many years the semi-wild Tarpan of the Russian steppes was regarded as the nearest living relative of the wild ancestor of the domestic breeds, but in 1881 the existence of a true wild horse was announced by the Russian naturalist Polyakov. This horse (fig. 29) occurs in the vicinity of the Gobi desert and the Great Altai Mountains, one variety living to the south-east, another to the west, and a third to the south of Kobdo. All three varieties are of a yellow-dun colour, the south-eastern (Zagan-Nor) form being especially characterised by a dark muzzle, dark points, and a dark mane and tail; in the western (Urungu) variety the muzzle is nearly white, the limbs are light down to the fetlocks, and the mane and tail are of a reddish-brown tint, the southern

¹ Points of the Horse, pp. 422-425.

(Altai) form being nearly intermediate in its colouration. The markings consist of a narrow dorsal band (often only evident along the croup and upper part of the tail in winter), faint indications of shoulder stripes, and indistinct bars in the region of the knees and hocks. In all three varieties the mane is short (5 to 6 inches) and upright in the autumn (fig. 30), but long enough in spring to arch to one side of the neck; in summer the upper two-thirds of the dock of the tail carries short hair, the distal third long hair, which continues to grow until it reaches the ground; in winter the upper two-thirds of the tail



Photo. by]

[The Duchess of Bedford

Fig. 29.—A young wild horse belonging to the Duke of Bedford.

(From Hayes' 'Points of the Horse'.)

carries hair from 2 to 4 inches in length—on the sides as well as along the back of the dock (fig. 31). In the mane and tail the wild horse hence agrees with zebra hybrids—*i.e.*, they differ from domestic horses in as far as the hair of the mane and of the upper two-thirds of the tail is renewed once a-year. The hair of the body and limbs is short in summer, but under the jaw and over the greater part of the body and limbs (including the back of the fetlocks) it is from 3 to 4 inches in length in winter.

The hoofs are narrower and have longer "heels" than in the common horse, but, as in the common horse, each limb is provided with a chestnut and with an ergot—the hind chestnut (hock callosity) being very long and narrow.

In the variety (figs. 32 and 33) occurring in the Altai south of Kobdo—probably the most primitive of the three—the head is large and coarse, and, compared with the length of the body, longer than in any domestic breed. In a side view (fig. 30) it is noticed the forehead is prominent (bumpy), the lower part of the face straight or slightly convex, the under lip long, and that the head forms nearly a right angle with the short neck.



Photo, by]

[C. Reel.

Fig. 30.—*The head of a two-year-old wild horse.*

Note upright mane, position of eye, bumpy forehead, and long lower lip.

The eyes are lateral in position, and appear unusually close to the ears owing to the great length of the space between the eye and the nostril. The ears are long, and generally project obliquely outwards (fig. 32) as in many cart-horses. To assist in supporting the heavy head the withers are fairly high. The croup is nearly level, but the hocks are usually bent and turned in. The wild horse differs somewhat in its habits from the wild ass (kiang) occupying the same region. The kiang herds retire to the mountains by night and feed on the open plains by day. The wild horses during the day frequent wide open plains or deserts, and betake themselves to the feeding and drinking places by night. Judging by the behaviour, during

the last two years, of the wild horse in my possession, I am inclined to think his less remote ancestors, though in all probability members of the Steppe fauna, lived for a time (perhaps during the Ice Age) in the vicinity of forests. As is the case with other gregarious animals, he strongly objects to be separated from his companions, and he also objects to have his movements circumscribed by fences. It has often been said that "nothing jumps better than a cart colt." The cart colt jumps because he



Fig. 31 —The tail of an adult wild horse, showing the short hair carried by the upper two thirds of the dock and the long hair of the distal third.

has sprung from big-jointed, broad-hoofed, forest-haunting ancestors whose existence often depended on their being able at a bound to clear fallen trees and other obstacles. The wild horse when shut up in a loose-box by himself is very restless, and keeps rearing up against the door until set at liberty: if placed in a paddock away from his special comrades he invariably succeeds in either scrambling over or breaking down the fence.¹

A wild kiang which I had under observation for a couple of years behaved quite differently. Placed in a paddock, he galloped backwards and forwards within a few feet of the fence or pushed against it with his breast, but never attempted to clear it. Arabs and certain Iceland ponies generally behave in the same way, not because they are unable to leap—they often prove excellent jumpers when trained—but because they are devoid of the jumping instinct. The opossums of certain parts of La Plata never have the opportunity of gratifying their climbing instinct, nevertheless the moment they are placed in a forest they proceed to climb trees and leap about amongst the branches. The wild

horse never encounters fences in the Gobi desert, but, probably because he had forest-bred ancestors which had often to cross fallen trees, he endeavours without a moment's hesitation to

¹ A few days after the arrival of my wild horse, he was accidentally separated from the pony sent to escort him from Hamburg. Though only a yearling (under 11 hands) he at once climbed over a gate four feet high

clear all obstacles that come in his way while true desert forms endeavour to break through them

It has been suggested that the wild horse of the Gobi desert is not a true wild animal, but only a domesticated breed that has reverted to the wild state¹ Against this view I may mention (1) that all the wild horses are of a yellow-dun colour, and that though those to the west of Kobdo differ in tint from those to the east, the eastern and western varieties seem to be connected by the less specialised variety to the south of Kobdo,



Fig. 32



Fig. 33

Fig. 32

Fig. 33

Przewalski's wild horse in summer coat

(1111 H13 & Points 1111 H14)

(2) that travellers in Central Asia all agree in stating that the Mongolian ponies vary greatly in colour—in a Chinese hymn known as the "Emperor's Horses" as many as thirteen colours are referred to, (3) the descendants of the horses which escaped from the Spaniards in America after several centuries

¹ It was formerly stated the wild horse was simply a hybrid between a Mongolian pony and a kiang. I recently showed that a hybrid of this kind is quite different from the wild horse. See *Proceedings Soc. Edin., vol. XLV, Part V, 1902-1903*

of freedom were of all sorts of colours; and (4) in horses which live in sub-arctic areas the hair at the root of the tail tends to increase so as to form a sort of tail-lock, which when caked with snow protects the hind-quarters during snow-storms; the complete absence of this tail-lock—fairly well developed in one of my Mongolian ponies—is a very strong argument against the assumption that Prjevalsky's horse is nothing more than a domesticated breed that has reverted to the wild state.

The wild horse of the Gobi desert is certainly the least specialised of all the horses living at the present day. In being of a yellow-dun colour, in shedding annually the hair of the mane and the hair from the upper two-thirds of the tail, in having ergots and chestnuts on the hind- as well as on the fore-limbs, and in having canines and fairly large upper first premolars, Prjevalsky's horse is distinctly primeval. Only in the all but complete absence of stripes and in having very long powerful jaws armed with relatively large teeth can the Gobi horse be said to be specialised.

It is extremely probable Prjevalsky's horse was familiar to the troglodytes who inhabited the Rhone valley in prehistoric times. One might even go further and say that in fig. 21, from an engraving in the cave of La Mouthe, we have a fairly accurate representation of the head of Prjevalsky's horse.

It is of course impossible to say which of the recent breeds are most intimately related to the Gobi horse. Though the head and ears are suggestive of some of the heavier occidental breeds, in its trunk and limbs it more closely resembles Mongolian and Korean horses, some of which, like Prjevalsky's horse, decidedly differ from Shires and Clydesdales in having a small girth owing to a want of depth of body—depth through the heart, as it is termed. To which domestic breeds the wild horse has contributed characters will probably become more manifest after he has lived for some time under domestication. That heavy occidental breeds are not pure descendants of Prjevalsky's horse is suggested by the fact that cart-horses, like zebras, have usually six lumbar vertebræ: the wild horse of Asia has only five, like the wild asses.

THE CELTIC PONY

(*Equus caballus celticus*).

From the most primitive member of the Equidæ family I shall turn to the most specialised—viz., to what I have ventured to call the Celtic pony.

In colour and markings a typical Celtic pony only differs from the intermediate (Altai) variety of the wild horse in having

a slightly darker muzzle, a less distinct light ring round the eye, and a more distinct dorsal band. The hair is similar in structure, but slightly longer in the Celtic pony during winter (fig. 34), more especially under the jaw,—where it forms the so-called beard,—over the hind-quarters, and on the legs. In the mane, tail, and callosities the Celtic pony is very different from the wild Gobi horse. The mane is made up of a mesial portion (nearly twice the width of the entire mane in an Arab) consisting of strong dark hair, and of two lateral portions the hair of which is lighter and finer and less circular in section than the hair of the central portion. The mane in the adult grows at



Photo by]

Fig. 34. —A typical Celtic pony in winter coat.

[G. A. Ewart

Note the "beard," forelock, and tail-lock

the rate of from 9 to 10 inches per annum, and as only about one-third of the hair is shed annually, the mane reaches a considerable length. Owing to the great width of the middle portion the one-half of the mane generally falls to the right side, the other to the left. The front part of the mane hangs down over the face to form a forelock (fig. 35).

The most remarkable feature of the Celtic pony is the tail. To begin with, the dock is relatively very short—so short that one is apt to suppose it has been docked. The distal two-thirds of the dock carries long dark hairs, the majority of which continue

to grow until they trail on the ground. During winter and spring the proximal third of the dock—about 4 inches—carries stiff hair from 3 to 6 inches in length, which forms what may be known as a caudal fringe or tail-lock (figs. 36 and 37). In the case of Arabs and other semi-tropical horses the first 1 or 2 inches of the dock are usually covered with short fine hair like that over the hind-quarters, but in the Celtic pony fine wiry hairs from 4 to 5 inches in length extend right up to the root of



Photo. by]

[Swan Watson.

Fig. 35.—*Head of Celtic pony represented in fig. 31, showing heavy mane and forelock, full eye, fine arched muzzle, wide nostril, and well-moulded under lip. Photograph taken in early summer.*

the dock under cover of the body hair of the croup. The most distal hairs of the tail-lock overlap, but are quite distinct from, the long persistent hairs carried by the lower two-thirds of the dock. The hair in the centre of the fringe, of the same colour as the dorsal band (fig. 37), projects obliquely backwards; the hair at the sides is light in colour and projects obliquely out-

wards. The presence of this very remarkable bunch of hair at the root of the tail was quite incomprehensible until I noticed what happened during a snowstorm. The moment the storm set in the pony orientated herself so that the snow was driven against her hind-quarters. In a few minutes the lock of hair was spread out to form a disc, to which the snow adhered, and thus provided a shield which effectively prevented the flakes finding their way around the root of the tail, where they would have



Photo by]

[G. A. Hewitt

Fig. 36 —*Celtic pony, to show tail lock in midwinter.*

soon melted and effectively chilled the thinly clad inner surface of the thighs. Provided with a caudal shield, long thick hair over the hind-quarters and back, and a thick mane covering both sides of the neck and protecting the small ears, a Celtic pony is practically snow-proof. While the storm lasted the pony in question stood perfectly still, with her head somewhat lowered, save when she shifted her position as the wind veered

from north-west to north. Very different was the behaviour of an Arab and of a thoroughbred-Highland colt close by. After trying various attitudes, the Arab, carrying her head low and to one side, made a rush for the shelter of an adjacent wood; the half-bred colt—prevented by her Celtic blood from running away—tried in vain one position after another, and long before the storm ceased looked thoroughly miserable and began to shiver as if chilled to the bone. The Celtic pony, on realising it was again fine, by a few violent shakes got rid of the adhering snow and proceeded to feed as if nothing unusual had happened. It hence follows that the tail-lock is not, as I at first assumed,



Photo by]

[C. Reul.

Fig. 37.—Celtic pony, to show dorsal band and tail-lock towards end of winter.

an inheritance from a primitive ancestor akin to the wild horse, but a highly specialised structure which eminently adapts the Celtic pony for a sub-arctic environment. I need hardly say the caudal fringe is not a product of artificial selection, for even in Iceland, where it reaches its maximum development, neither its existence nor its use has, as far as I can gather, ever been referred to. It need only be added that to maintain a tail-lock of this kind it is necessary that the short wiry hairs of which it consists require to be renewed once a year. Fig. 38 was taken in July, when the majority of the wiry hairs at

the root of the tail had been displaced by shorter finer hairs, and shortly after the mane had been completely removed in order to ascertain the rate of growth.

In separating asses and zebras from horses, stress has hitherto been laid on the difference in the mane and tail, and especially on the absence of hind chestnuts. As already pointed out, the wild horse during summer in its mane and tail agrees with asses and zebras. The mane and tail are hence no longer of specific importance. This is also true of the chestnuts, for in the Celtic pony, as in asses and zebras, the hind chestnuts (hock

callosities) are completely absent. The callosities I regard as remnants of pads of use to the remote plantigrade ancestors. In the wild horse, as in the vast majority of heavy and cross-bred horses, the hind chestnuts reach a considerable size, but in asses and zebras and the Celtic pony I have failed to find any rudiments of hind chestnuts either before or after birth. Further, in the Celtic pony the front chestnuts are small and, still more remarkable, the fetlock callosities (ergots) have entirely vanished; in asses and zebras the ergots are always present, and in some cases still play the part of pads. The Celtic pony is hence not

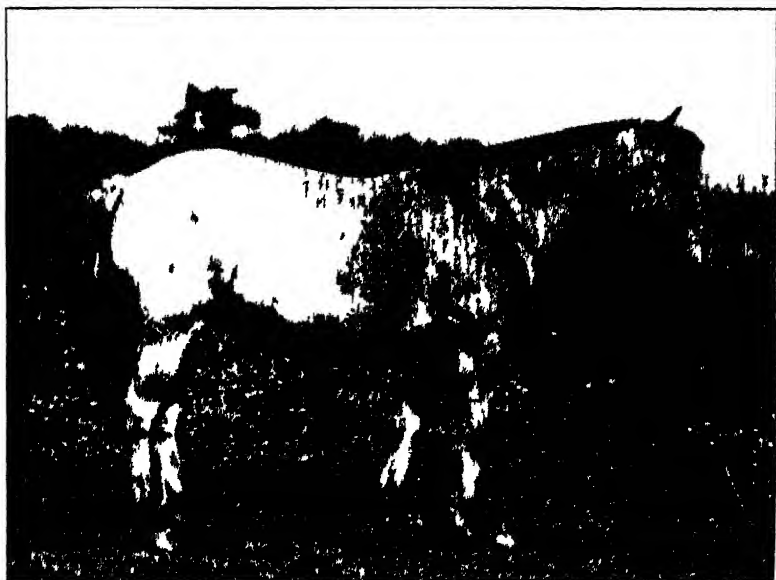


Photo by]

[M. H. Hayes

Fig. 38. *Celtic pony in midsummer with the mane removed*

Note small head, sloping shoulder, short back, rounded quarters, and that only a vestige of the tail lock persists.

only more specialised—further removed from the primitive type—in its mane and tail, but also in having lost the fetlock pads (ergots) and the hock (heel) callosities. Nature makes little effort to get rid of useless vestiges, as long as they are harmless. When an ergot or a chestnut is accidentally torn off there is considerable loss of blood. It is conceivable that in the remote past horses which happened to be born without ergots proved better adapted for a life in the sub-arctic regions,—were less likely to suffer from injury when moving through frozen

snow and to become a prey to wolves,—and hence had a better chance of surviving and leaving descendants.¹

As to the limbs, it need only be further mentioned that the “bone” is flat, that the joints are small, and the hoofs wide at the “heels” and almost circular in outline.

There is also evidence of specialisation in the teeth of the Celtic pony. In many horses—*e.g.*, the horses of South-eastern Asia—the canines and upper first premolars (wolf-teeth) are well developed, but in the Celtic pony the first premolars seem to be invariably absent, while the canines are either absent or very minute even in old males. In all the typical Celtic ponies I have seen the head is small, Arab-like in outline (fig. 35), and well put on to a relatively long neck; the muzzle is fine and slightly arched, the under lip short and well moulded, the nostrils are wide, and the eyes on a level with the forehead, while the ears are short, white-tipped, and carried as a rule in an upright position. Owing to the shortness of the jaws the proportion of the head to the body is as 1 to 2·50 instead of 1 to 2·20, as in the wild horse.

From fig. 38 it may be gathered that the shoulders are well laid, the quarters somewhat rounded, while the back and legs are decidedly short. Except in size I have been unable to discover any difference between the skeleton and teeth of the Celtic pony and the small horse of the “elephant bed” of the Brighton Pleistocene. In the most northern part of Iceland, where the few pure specimens of the Celtic pony survive, only a height of 12 hands (48 inches) is reached—under more favourable conditions the height would probably be 50 or 52 inches, the size of some of the “elephant-bed” horses and of the smaller variety of the desert-bred Arab to which the small slender-limbed occidental pony closely approximates.

In temperament the Celtic pony is very different from the wild horse. How far this difference is due to artificial selection it is of course impossible to say. Captain Hayes had no difficulty in handling the wild horse in my possession, but from first to last, though giving evidence of marked intelligence, it was absolutely irresponsive and spiritless. A Celtic pony, on the other hand, rapidly learns what the trainer wishes and responds with alacrity: being neither nervous nor afraid of man, in a few days its education is complete. In its keenness and speed, staying power and agility, a pure Celtic pony is as different from an ordinary heavy-headed Iceland pony (*i.e.*, a dwarf horse) as an Arab is from a cart-horse.

The question may now be asked, Is my most typical Celtic

¹ If, as seems likely, the absence of ergots (*i.e.*, of spurs in the centre of the footlocks) is an advantage in arid regions, such as the Libyan plateau, we can understand their frequent absence in Arabs and Arabs.

pony a pure or nearly pure specimen of a once widely distributed wild species, or is it at most an approximation to an ideal type, living representatives of which no longer exist. I regard the pony selected as a type an almost pure representative of a once widely-distributed wild species, for the following reasons: (1) In its colour and markings it is almost identical with Prjevalsky's horse, and not unlike some of the varieties of the wild Asiatic ass. (2) The hind chestnuts and all four ergots are completely absent. (3) The tail-lock is perfectly adapted for its work: were the hairs shorter the fringe would be ineffective; were they longer the snow-shield, if ever formed, would rapidly disintegrate. (4) The first premolars are completely absent and only one of the four canines is represented, and that only by a minute peg which barely projects beyond the gum. (5) The pony in question proved sterile with stallions belonging to five different breeds as well as with a Burchell zebra and a kiang; but she at once bred when mated with a yellow-dun Connemara-Welsh pony, which closely approximates to the Celtic type. (6) Ponies having the more striking Celtic characteristics occur in isolated and outlying areas where one would expect to find remnants of an ancient highly specialised species which perchance reached the Old World from the New in pre-glacial times or during warm inter-glacial periods—in, *e.g.*, Iceland (which has been almost completely isolated since the twelfth or thirteenth century), the Farøe Islands, Shetland, the Hebrides, the west of Ireland, and Finland.¹

That the Celtic pony of Iceland is not a product of artificial selection may be inferred from the two following considerations, *viz.*: (1) Until about a century ago one of the favourite amusements of Icelanders was horse-fighting—a sport which long took the place of cock-fighting in England. In a medieval engraving—reproduced in a recent work by Brunn²—numerous horses are represented fighting after the manner of the Godolphin Arabian and Hobgoblin in Rosa Bonheur's well-known picture. For this purpose large-headed, heavily built individuals would doubtless be preferred—that this was the case the engraving strongly suggests,—from which it follows that artificial selection, in as far as it was practised during the middle ages, would tend to eliminate the Celtic variety. (2) During recent years Icelanders have preferred for their own use ponies over 13 hands high, whose natural gait is the amble—the pure Celtic pony apparently never in Iceland exceeds 12 hands, and, as far as my experience

¹ It may be mentioned that ponies without hind chestnuts are said to occur in Japan and North Africa,—two decidedly outlying regions,—and, as Captain Hayes has pointed out, a considerable percentage of Arabs are devoid of ergots.

² Hesten i Nordboernes Tjeneste paa Island. Kjøbenhavn, 1902.

goes, it never adopts the ambling gait: the majority of the large-headed Iceland ponies are pacers from their birth.

Flat-nosed Variety of the Celtic Pony.—In the typical yellow-dun Celtic pony from the north of Iceland the head is wonderfully suggestive of a high-caste Arab; there is a good width of forehead and a slight dip below the prominent eyes. The lower part of the face is narrow, and the fine muzzle is slightly arched from side to side and from above the wide nostrils to the upper lip. Moreover, as in many Arabs, there is a shallow groove along the middle of the face. In the Faroes, the Hebrides, and in Shetland there are slender-limbed ponies which, except in

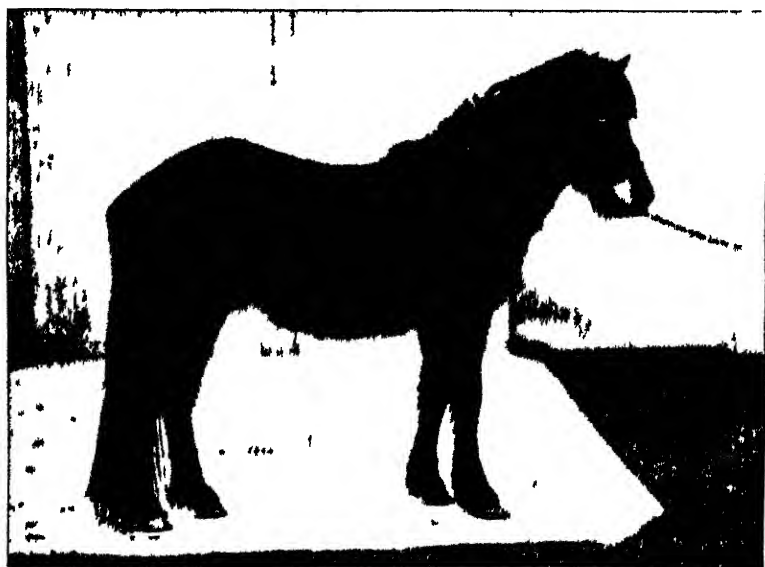


Photo by]

[C. Reid

Fig. 39 —A member of the all but extinct old Hebridean race of ponies. This, a 12 hands three year old pony, very closely resembles the dark-brown Faroese variety of the Celtic species.

Note the muzzle very decidedly differs from that of the typical Celtic pony in fig 35

their colour and the shape of the head, and in some cases the form of the hind-quarters, closely agree with my typical Celtic pony. In these ponies (figs. 39 and 40) the depression below the eyes is more pronounced, and extends wellnigh to the muzzle, which is nearly flat. The nostrils look downwards, and the space between them, instead of being arched as in the Iceland specimen, is flat and forms nearly a right angle with the face. Figs. 35 and 40 bring out these differences.

Some of these flat-nosed ponies are of a foxy-red colour, others are dark brown. According to Landt, the majority of the Farøe ponies a century ago were foxy-red—the St Kilda ponies, eighteen in all, seen by Martin at the end of the seventeenth century were also of a red colour—the others were with few exceptions dark. A foxy-red Farøe pony in my possession has neither a dorsal band nor bars on the leg, but it has a light mane and tail, a nearly straight croup and well-formed hind-quarters. All the other foxy-red Farøe ponies I have seen or heard of closely resemble the one in my collection.

The dark Farøe ponies (fig. 40), like the dark Barra ponies



Photo. by]

[C. Reid.

Fig. 40.—Head of a nine-months Farøe colt with a turn muzzle, a light-coloured lower eyelid, a depression below the level of the eyes, and a "flat nose."

(fig. 39), only differ from the foxy-red ponies in not having in every case a straight croup and a high-set-on tail. The dark variety of the Celtic pony found in Shetland is in build more like the typical Iceland specimens than the Farøe variety. Of a large number of Shetlanders examined, a pony¹ belonging to the Ladies Hope is the nearest approach to the ideal Celtic type. In his head, shoulders, hind-quarters, and limbs he resembles a miniature high-caste Arab—not, as is the case with

¹ This pony ("Vulcan") now at Great Hollenden Farm, Kent; though measuring under 32 inches at the withers, has nearly as much "bone" (6 inches) as some 13·2-hands Arab ponies.

many shelties, a miniature cart-horse. But for his colour, the presence of front ergots, and the meagreness of the tail-lock, he would be a nearly perfect specimen of the true Celtic race.

Herodotus (*v.g.*) says of the horses of the Sigynnæ,—the only tribe he knew the name of across the Danube,—they “are shaggy all over the body, to five fingers in depth of hair: they are small, flat-nosed, and unable to carry men; but when yoked to chariots they are very fleet, therefore the natives drive chariots.” This description, as far as it goes, is singularly accurate of the foxy-red Faeroe ponies, even to their being very fleet “when yoked to chariots.” It is extremely probable that



Fig. 41.—A member of the white-maned Uist race of horses.
Height at withers 14 hands.

in the red-coloured Faeroe ponies we have a remnant of a very old and once widely distributed variety, the origin of which is never likely to be revealed. For some unaccountable reason the silver mane and tail are as a rule either handed on untarnished to cross-bred offspring or they reappear in the second or one of the subsequent generations. It is hence possible that various large breeds—such as the Suffolk Punch, the white-maned horses of the Hebrides (fig. 41) and of the north and west of Ireland, certain silver-maned Hungarian and Russian races, not to mention Chitabob and other English

thoroughbreds—have all inherited their light manes and tails from an ancient foxy-red variety of the Celtic pony.

The origin of the dark-brown variety of the Celtic pony is also wrapped in mystery. These dark-brown ponies may represent another old variety from which the Fámors have sprung—a variety which has contributed the tan-coloured muzzle and the ring round the eye so characteristic of many of the best Highland and Island garrons. One of these dark-brown ponies, brought from Barra as a two-year-old, looked for a time like a miniature thoroughbred. Now as a three-year-old (fig. 39) it might pass for one of the oldest and best type of the dark Farøe ponies. Neither the dark nor the red Farøe ponies ever possess all the Celtic characteristics; at the most they are three parts pure, and I may add they cross freely with Norwegian and other breeds, generally transmitting such Celtic “points” as they possess to their mixed offspring.¹ It is worthy of note that in some of the small-headed horses engraved in the Combarelles and other caves inhabited in Palæolithic times the croup is straight and the tail set on high as in many Arabs; in others the tail, instead of being in a line with the croup, looks as if it had been an afterthought—an appendage inserted fairly well up in some cases, lower down in others, as is the case in many large and small horses with rounded quarters. In the engravings showing a small-headed horse with a straight croup we seem to have the foxy-red variety represented; in those with somewhat drooping quarters we may have a representation of the dark-brown variety of the Celtic pony.

If one may judge from its specialisation and from its being now adapted for sub-arctic conditions, the Celtic pony belongs to a variety which at a very remote period branched off from the main stem and possibly reached Europe and North Africa long before the advent of the Neoliths—to become the progenitors not only of occidental but also of African races.²

¹ See Marshall and Annandale, *Proc. Cam. Phil. Soc.*, vol. xii., Pt. iv.

² That the Celtic pony is akin to the smaller high-caste Arabs has already been hinted. Professor Ridgeway has given good reasons for the belief that the Arab has mainly sprung from Libyan races. Captain Hayes has pointed out that a very considerable percentage of Arabs are without ergots, and I had an Arab (Benzack) some years ago to which a New Forest pony had a foal completely without one hind chestnut and with only a minute vestige of the other. As a mule out of this mare had hind chestnuts, the presumption is the absence of chestnuts was due to the Arab sire. The only fundamental difference, apart from the coat, mane, and tail, between many small Arabs and a Celtic pony is in the ears: in the Arab they are long and often incurved at the points. The long ears of the Arab may either be due to Eastern blood of the Kattiawar kind or to long ears being an advantage to the wild ancestors that frequented the great Libyan plateau, as long ears are of advantage to the mountain zebra, and to the kangaroo of the Australian bush. About the origin of the large varieties of Arabs provided with ergots, with hind chestnuts like those of Prjevalsky's horse, a somewhat long head, a tendency to a Roman nose, large joints, and a circumference of 7½ to 8 inches below the knee, I am unable to offer an opinion.

As already mentioned, some of the engravings in the Combarelles and other caves are wonderfully suggestive of the Celtic pony. In fig. 25 one of these drawings is reproduced. In the size of the head, in the ears, the profile, the position of the eye, and under lip this horse agrees with the true pony represented in fig. 38, but obviously differs from the horse which served as

the model for the head on the right of the engraving—a horse evidently with a Roman nose, large ears, eyes lateral in position and far from the muzzle, and a long thick under lip—in a word, a horse with the features of a member of the Shire breed or of the old Spanish race from which the Austrian Kladrub breed was derived. In fig. 42, which reproduces another Palæolithic drawing, the muzzle in its outline approaches that of the Hebridean pony in fig. 39—further evidence perhaps that the flat-nosed variety of the Celtic species is very ancient. That the Celtic pony branched off at a very remote period from the main equine stem (which is to-day best represented by Prjevalsky's horse) will, I think, be admitted when it is borne in mind that in its skeleton and teeth it agrees with the small species in the "elephant bed" at Brighton, that in outline it approaches some of the engravings made by the artist-hunters of the Early Stone Age, and that it has a more specialised tail and fewer vestiges or rudi-

ments than any other living member of the Equidæ family.

As might have been anticipated, Celtic characters can often be identified in British and other occidental breeds. Many thoroughbreds, which are an unequal blend of Barbs and of Arabs in which Eastern races often prevail, and of light and

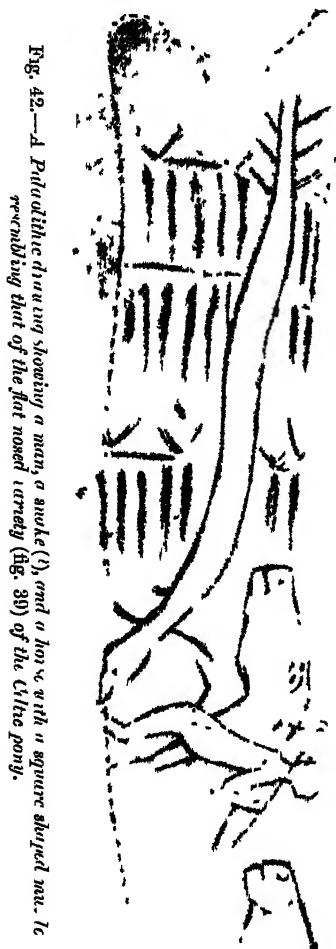


Fig. 42.—A Palæolithic engraving showing a man, a snake (?), and a horse with a square shaped muzzle resembling that of the flat nosed variety (fig. 39) of the Celtic pony.

heavy occidental varieties, show traces of Celtic ancestors. Many small thoroughbreds "ride like a pony," or have a pony head or pony legs, some even want the ergots or hind chestnuts, or the tail has a vestige of a fringe, or there is the gait and temperament, alertness and intelligence, of the pony. Many of the Highland garrons have pony characteristics, and this is also true of all the old mountain and moorland breeds, more especially of the mealy-nosed Hamoor ponies and some of the better bred dun-coloured Connemaras.

Even in Clydesdales of the older type pony characters sometimes surge to the surface, while in cross-bred animals they sometimes predominate. Recently I heard of a powerful active 17-hands horse—with a wonderful reputation for speed, strength, and staying power—in which the hind chestnuts, greatly to the surprise of the owner, were completely absent. On making inquiries as to the pedigree of this horse I ascertained he was bred in Caithness, and was the grandson of a Highland pony.

THE NORSE HORSE

(*Equus caballus typicus*).

During prehistoric times in certain parts of Europe a Tundra fauna gave place to a Steppe fauna, which later was succeeded by a Forest fauna. Evidence of this succession we especially have in the rock-shelter at Schweizersbild near Schaffhausen. In the lower deposits the remains of the reindeer, musk-ox, variable hare, arctic fox, and other Tundra forms occurred. Nearer the surface were relics of hamsters, the woolly rhinoceros, kiang, horse, and other denizens of the steppes; and on still higher layers the bones of the beaver, hare, and squirrel, the badger, pine martin, and wild boar, the stag, roedeer, urus, horse, and other recognised members of a true Forest fauna.

In the case of the Equidæ it is often extremely difficult to determine to which species any given bones belong; and hence it is impossible to state definitely that the horses found along with the hamsters and other Steppe forms essentially differed from those which were contemporaries of the stag and wild boar and other typical Forest forms.

It may, however, be assumed that even in post-glacial times the majority of the inhabitants of the steppes would when mature be quite or nearly whole coloured, while frequenters of the forests would as often be either striped or spotted—that, *e.g.*, the horse which frequented the Rhine valley along with the kiang and woolly rhinoceros would resemble the wild horse (*E. c. przewalskii*) which, with the kiang, now lives in the vicinity of the Great Altai Mountains; while the horse which at a sub-

sequent period was a contemporary of the wild boar, stag, and roedeer would be more or less richly striped, and in its limbs and general conformation adapted for a life in or near forests.

That there is some ground for this assumption will, I think, be admitted when due consideration is given to results obtained by crossing various kinds of horses with a Burchell zebra. When ponies of the Celtic type—*i.e.*, ponies which in their colour are identical with Prjevalsky's horse, almost certainly the lineal descendant of the Steppe horse of Palæolithic times—are crossed with a male Burchell zebra, hybrids are obtained which, while in build strongly suggesting a Burchell zebra, are



Photo. by]

[G. A. Ewart.

Fig. 43.—A richly striped dark yellow-dun horse of the Norse type, which has a general resemblance to the Combarilles horse reproduced in fig. 23.

as profusely striped as the great zebra of Somaliland—have at least five times as many transverse stripes across the trunk as occur in their zebra sire. When, however, pony mares of the Norwegian type are crossed with a Burchell zebra the hybrids resemble in make their Norse dams, and in their markings closely approximate the common or mountain zebra. The explanation of these remarkable differences seems to be that in the case of the Celtic pony hybrids the remote (Grevy-like) ancestors of the Burchell zebra control the development and

determine the plan of the decoration, while in the case of the Norse pony hybrids the remote striped-horse ancestors contribute the more obvious characters—the Norse ponies having more influence in determining the plan of striping than the highly specialised Celtic ponies, from which stripes had probably all but completely disappeared countless generations before they began to fade on the horses which belonged to the Forest fauna.

It is probable that the highly specialised Celtic pony as well as the primitive Gobi wild horse belong to the Steppe fauna, and it is equally probable that the yellow-dun (Fjord) horse, in which a striped coat may be said to be latent, belongs to the Forest fauna. If this is admitted, it follows that the environment of the Norse race has been for untold ages so different from that of the Celtic pony and the wild horse that it centuries ago acquired the rank of a distinct species, or at least a well-marked natural variety.

The question now arises, Does there exist in any of the outlying parts of the world (where artificial selection has been made use of to conserve old rather than to create new types) horses of a red rather than of a yellow-dun colour—more like the red-deer than the kiang,—horses with a sufficient number of imperfect stripes on the body and bars on the legs to indicate descent from ancestors decorated after the manner of the mountain zebra? As is now generally known, dun-coloured horses with remnants of a striped coat now and again (as the result of reversion) make their appearance in all parts of both the Old and New World—even in Arabia, where a dun-coloured horse is said to be “only fit for a Jew to ride.” It is also a matter of common knowledge that dark yellow-dun horses, sometimes with fragments of numerous stripes, are always to be met with in, amongst other places, Mongolia, Tibet, the North-West Provinces of India (especially in the State of Kattiawar), and in the north-west of Europe, more especially in Norway, the Highlands and Islands of Scotland, and in Iceland. I have had in my pony stud typical Arab, Mongolian, Norwegian, Shetland, Highland, Hebridean, Iceland, and Connemara ponies, and a half-bred Kattiawar marked with many stripes, and I have seen pure Kattiawar and other striped ponies in Lord Arthur Cecil’s stud in the New Forest. With the exception of the Kattiawars, which, probably as the result of rigid selection, stand apart, all the others have many points in common,—some of the dun Mongol ponies agreeing closely with Norwegians,—but they all—the Kattiawars more than the rest—decidedly differ from *E. c. prjevalskii*, the wild horse of the Great Altai Mountains, and from typical specimens of the light yellow-dun Celtic pony.

The most richly striped horses I have hitherto come across occur in the north-west of Scotland. One of these (fig. 43) recently examined is alike in make, colour, and markings so unique, and looks so little modified by domestication and artificial selection, that it must, I think, be considered as a fairly typical specimen of a once wild species. The history of the yellow-dun striped race, to which the specimen alluded to belongs, has not yet been written, but there is little doubt that it was introduced



Fig. 44.—Face of a yellow dun Norse pony showing zebra-like markings.

into Scotland from Scandinavia about the end of the eleventh or beginning of the twelfth century. As this yellow-dun striped race may very well have been familiar to Linnæus, it may, I think, be taken as the type of the large occidental breeds, and known as the *Equus caballus typicus*. A typical specimen of the Norse variety is of a dark yellow-dun colour, with black "points" and a nearly black mane and tail. The mane is long and heavy, and tends to fall to both sides of the neck as in the Celtic pony. Only a few hairs at the root of the tail are shed in summer, and there is no attempt to form a tail-lock in winter; while the footlocks, never very long, are limited to the region of the ergots. The forehead is decorated with narrow stripes, which in their number and arrangement (fig. 44) agree more

with the mountain than the true Burchell zebra. A broad dorsal band extends along the back to lose itself in the tail; there are stripes on the neck, and faint stripes extend a short distance from the dorsal band across the withers and body; while the legs, especially in the region of the "knees" and hocks, are marked by distinct bars.

The ears are short and carried in a nearly upright position; the forehead (which is not particularly wide), in having two ridges extending upwards from the prominent eyes to meet under the forelock, differs greatly from the "bumpy" forehead of Prjevalsky's horse and the flat forehead of the Celtic pony. The space between the orbit and the nostril is relatively longer than in the Celtic pony, but shorter than in Prjevalsky's horse. The eyes project beyond the level of the forehead. In the Celtic pony the eyes are large, and adapted for a wide range; in the wild horse they are some distance from the front of the head; in the Norse horse they are small, and look downwards rather than forwards. The outline of the face becomes convex above the muzzle, and ends in a somewhat long upper lip—in the Shire and other Roman-nosed breeds the arching may begin about the middle of the forehead and extend right down to the muzzle. In the neck and shoulders, trunk and limbs, the Norse variety may be said to be intermediate between a true pony and a small cart-horse of the Suffolk type.

Compared with the wild horse, the withers are lower and the hind-quarters more rounded, and the tail springs more abruptly and at a lower level, and hence fails to convey the impression that it is a direct continuation of the trunk. The dock is relatively longer than in the Celtic pony, but shorter than in the wild horse. The limbs are short, but the joints are large and the hoofs broad, hence in a side view of the foreleg a considerable increase is noticed as the thick fetlock joint is reached—*i.e.*, the back tendons are not parallel with the tendons running along the front of the cannon (middle metacarpal) bone.

The members of the Norse variety are noted for their intelligence and docility, and for the ease with which they adapt themselves at one part of the year to work on the farm, and at another to the more trying work of carrying the stricken deer from the distant forest.

It will be evident from what has been said that the Norse horse differs chiefly from the wild (Tobi) horse in being of a darker dun colour, in being far more richly striped, in the shape of the head, size of the ears, position of the eyes, and also in the muzzle, mane, tail, hind-quarters, joints, and hoofs. From the Celtic pony the Norse horse also differs in the colour and markings; but it especially differs in the tail and the greater proportional length of the distance between the eye and the nostril, and in having a complete set of ergots and chestnuts. It is inconceivable that the Norse variety could revert to the Prjevalsky horse type, or be regarded as an offshoot from the Celtic pony.

The question may now be asked, Is there any evidence that the Palæoliths of the south of Europe were familiar with

horses of the Norse type? Fig. 43 gives an imperfect idea of a specimen of the Norse race from the west of Ross-shire. Being from a photograph taken in a Scotch mist during September, the figure shows nothing of the stripes, but it indicates accurately enough the general outline, the prominent eye, short ears, and especially the slight but very characteristic Roman nose, and long upper lip, the rounded quarters, and the position of the tail. If this figure of a horse still living is compared with fig. 23, which faithfully reproduces an engraving made thousands of years ago in the Combarelles cave by one of the

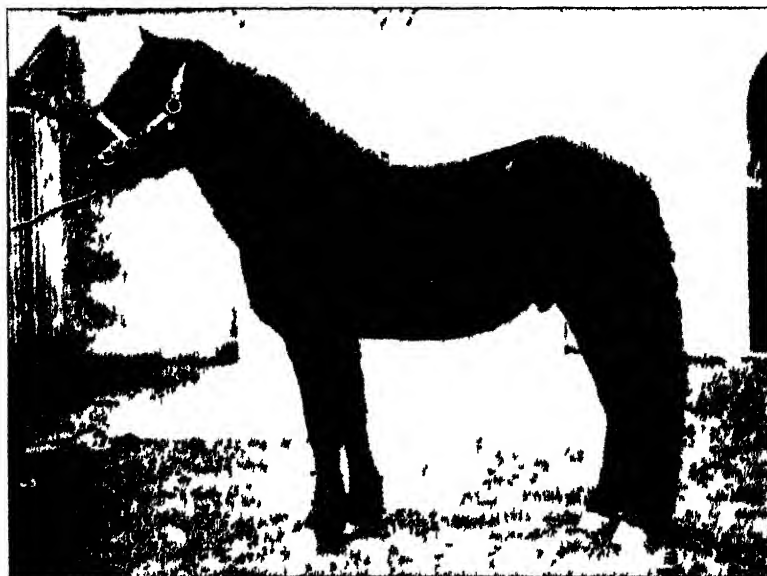


Photo by J

[G Reid

Fig. 45 — 'Atholl,' a three-year old 15-hands garrison, belonging to the Congested Districts Board for Scotland.

See the Duke of Atholl's horse "Hind Liddle, dun "Gairk Gullach, now the property of Lord Arthur Cecil "Atholl is almost certainly a blend of the Norse and Celtic types to which either Flemish or Percheron blood has been added

artist-hunters of the Early Stone Age, it will, I think, be admitted the Norse horse belongs to a very ancient race.

Up to the day I saw the Ross-shire yellow-dun Norse horses I regarded the robust Roman-nosed Combarelles horse as at the best a fancy picture; but the more I compared the living specimens with the prehistoric figure the more convinced I was that in some of our deer-stalking ponies we may have but slightly altered descendants of a wild post-glacial species. One might

even go further and say the ancient horse reproduced in fig. 23, like the modern one represented in fig. 43, took part in hunting expeditions. According to one interpretation, the Combarelles horse is draped with an ornamental covering; but I think it is quite as likely it is carrying from some distant hunting-ground a portion of an antelope or a reindeer, held in position by ropes made from the horse-tails, apparently as carefully secured in olden times as is the "brush" by the present-day fox-hunter.

I need only add that I regard the Norse race as the foundation of what in the Highlands are known as garrons. A very typical garron, belonging to the Atholl strain, is represented in fig. 45. Horses of this type may very well have been originally obtained by blending the old indigenous yellow-dun striped race with Flemish and French breeds imported direct from the Continent or introduced from England during the middle ages. Further, it is extremely probable the Norse race took part in forming the small active Clydesdales of a former generation.

OTHER OCCIDENTAL HORSES.

In addition to oriental and African varieties, which doubtless include several wild species amongst their ancestors, there are two or more occidental varieties which in various ways differ from the Norse and Celtic races and from Prjevalsky's horse.

One of the latter include long, low, heavily built animals with unusually long heads; another consists of short-bodied animals with a large head and a pronounced Roman nose.

The long-headed variety which occurs in the Hebrides, the Central Highlands, and in the south of Europe, reminds one of the horses (fig. 26) engraved during the Stone Age on a piece of reindeer-horn. In one specimen of this variety met with in Perthshire (a 14-hands grey mare, which produced a dun colt to a grey garron) the profile is straight and the distance from the orbit to the nostril is 13 inches—*i.e.*, 2 inches more than in a member of the Norse breed of a like size, and 4 inches longer than in a 14-hands Connemara pony allied to the Celtic race. Some of these long-headed forms with a straight profile and a well-moulded muzzle resemble the horses of the Parthenon.

Horses with a pronounced Roman nose also occur in the Western Islands and Highlands of Scotland, and in Ireland, Austria, America, and other parts of the world into which breeds were introduced from Spain. Whether the Highland specimens are the improved descendants of an indigenous race or the mixed offspring of heavy breeds recently introduced I am unable to say. One of this Roman-nosed type, of a yellow-dun colour, met with in the Outer Hebrides was especially interesting. It very decidedly differed from members of the Norse race in the same

district, but, on the other hand, it agreed in the outline of the head with some of the engravings (fig. 25) in the Dordogne caves. It is hence conceivable that the Roman-nosed variety (from which the modern Shire breed may be an offshoot) is a very old one—a variety which was firmly established centuries before domesticated breeds first made their appearance in Europe.

SUMMARY.

I have endeavoured to indicate that in post-glacial as in pre-glacial times there were several distinct species of horses, and that it is extremely probable some of the prehistoric species and varieties have persisted almost unaltered to the present day. I have shortly described three distinct kinds of living horses—viz., the wild horse of the Gobi desert (*E. c. przewalskii*); the Celtic pony, which though no longer wild may be known as the *E. c. celticus*; and the Norse horse, which may very well stand as the type of the large occidental breeds and be known as *E. c. typicus*. I have also pointed out that in addition to these three very distinct types—two at least of which have taken part in forming quite a number of our British breeds—we have a long-headed, heavily built variety with a straight profile, and a long-headed, heavily built variety with a more or less pronounced Roman nose. I have also indicated that in addition to several occidental varieties there are several African and oriental varieties; and I might have added that in as far as the English thoroughbred is a mixture of African and oriental varieties and of occidental light and heavy varieties, it might be cited as an excellent example of a breed which includes amongst its ancestors several wild species—a breed which has had a multiple origin.

MILK INVESTIGATIONS AT GARFORTH, 1903.

By CHARLES CROWTHER, M.A. (Oxon.), Ph.D.,

Lecturer in Agricultural Chemistry in the Yorkshire College, Leeds.

DURING the years 1900, 1901, and 1902 experiments were conducted by Mr H. Ingle with the dairy herd at the Manor Farm, Garforth, with a view to determining the chief factors which influence the quantity and quality of the milk-secretion. The results of these experiments were published in the last three volumes of the 'Transactions,'¹ and are of great interest and importance.

¹ Trans., 5th ser., 1901, vol. xiii. p. 218; 1902, vol. xiv. p. 281; 1903, vol. xv. p. 195.

The chief results may be briefly summarised as follows:—

- (a) The proportion of fat in the milk of individual cows is liable to enormous variation from time to time from causes which are unknown.
- (b) The proportion of solids-not-fat is fairly constant in the milk of any individual cow, but varies much with different animals.
- (c) The yield in the morning is greater than that in the evening. Morning milk, further, is much poorer in fat, but usually slightly richer in solids-not-fat, than evening milk. The differences are, however, very considerably less when the intervals between consecutive milkings are equal.
- (d) The mixed morning milk of a dairy shorthorn herd may often contain less than 3 per cent of fat during summer or early autumn if the milking be performed at the usual unequal intervals.
- (e) Provided the cows are receiving liberal rations, variations in the nature of the food supplied have little influence on the milk secretion. So far as any change is effected, it would appear that foods rich in albuminoids (*e.g.*, gluten meal) slightly improve both the yield of milk and the proportion of fat and solids-not-fat—at least for a time; whilst large quantities of carbohydrates, though increasing the yield somewhat, cause a slight deterioration in quality.
- (f) Concentrated food supplied liberally in the morning increases the fat content of the morning milk.
- (g) Milk secreted in different portions of the udder may differ considerably in composition, both in fat and solids-not-fat, the variations being most significant in the case of the latter, since the lowest proportion was generally found in the milk yielded by one particular quarter—the left fore-quarter.

These results have attracted a considerable amount of attention, especially the revelation that it is possible during the summer months for even the mixed milk of a good, well-nourished dairy herd to fall below the standard of 3 per cent of fat embodied in the regulations for the sale of milk at present in force.

In view of this fact it is obviously incumbent on every dairy farmer to avail himself of all practicable means of improving the quality of the morning milk supply.

According to the results summarised above it would seem that such an improvement can be effected mainly in two ways:—

- (1) By equalising the periods between successive milkings.
- (2) By supplying concentrated, highly nitrogenous food liberally at the morning meal.

Of these alternatives the former is decidedly the more effective, and should be adopted wherever possible. In a large number of cases, however,—as at Garforth,—the exigencies of trade and other causes necessitate milking at unequal intervals, and, under these circumstances, the second alternative must perforce be adopted.

In this connection, however, the fact must be recalled that the experiment in which the enriching influence of highly nitrogenous food was demonstrated ('Trans.,' 1902, p. 295) was carried on for only a relatively short period (20 days), and hence, as Mr Ingle pointed out, it is possible that such improvement is only of a temporary nature, and that after a time the old order of things may be restored, and the milk may return to its normal condition.

In view of its great importance it, therefore, seemed desirable to further investigate this point, and accordingly the experiments described in the present communication were carried out at Garforth, by the author, in the months of June and July 1903. Advantage was also taken of the opportunity for re-investigating the effect on the milk-secretion of distributing the concentrated food between the morning and evening meals.

The investigations commenced with the morning milk of June 10 and ended with the evening milk of July 31,—thus extending over a period of 52 days, and comprising analyses of nearly 2000 separate samples.

The following table gives particulars as to age, &c., of the eighteen cows included in the experiment.

No of cow.	Age.	Weight on July 1			Days since calving, up to June 10.	Date when last served
	Years.	cwt	qr	lb		
2	3	10	2	16	220	June 10
4	7	9	2	6	64	Not
5	6	11	2	0	79	May 25
6	5	13	0	10	144	June 11
7	5	12	1	14	23	Not
8	5	12	0	14	43	"
9	4	13	0	8	104	May 8
10	5	13	1	10	365	Geld
11	9	12	3	18	427	"
12	5	11	1	0	37	Not
14	5	12	1	12	108	May 10
15	5	10	3	8	79	June 10
17	6	11	1	0	99	May 19
18	8	12	1	0	92	Geld
19	5	10	2	0	43	Not
20	5	11	0	0	98	June 8
22	5	10	1	20	170	Not
23	5	10	2	18	73	June 2

With the exception of Nos. 2, 10, and 15, they are the same cows as were employed in the investigations of the previous summer.

For several weeks previous to the commencement, and throughout the whole of the experiment, the cows were at pasture day and night, being brought up and milked in the cow-house at about 6 A.M. and 3.30 P.M. daily.

The *mixing* and *sampling* of each cow's milk were performed in the cow-house at each milking, the samples being subsequently examined in the chemical laboratory attached to the farm, usually within twelve to twenty hours after milking.¹

In addition to the samples of the milk of each individual cow, a sample was also taken at each milking of the mixed milk of the whole herd.

The methods of sampling and analysis employed were as nearly as possible identical with those adopted by Mr Ingle, and of which full details are given in the 'Transactions' for 1903, pp. 137-139.

The uniform accuracy of the Gerber method of estimating the *fat* was fully confirmed by duplicate determinations made with a very large proportion of the samples. The results obtained were almost invariably in very close agreement, the difference rarely amounting to 0.05 per cent.

The *specific gravity* determinations were carried out with the Westphal balance used by Mr Ingle in 1902. With this instrument results of a high order of accuracy are obtainable with ease and rapidity. The observed specific gravities were converted into their equivalent values at 15.5° C. (60° F.) by means of Richmond's slide-rule.

From the corrected specific gravities and the observed percentages of fat, the proportions of *solids-not-fat* were calculated also by the slide-rule based on the well-established formula—

$$\text{Total solids \%} = \text{fat \%} \times 1.2 + \frac{\text{Sp. gr.} \times 1000 - 1000}{4} + .14.$$

The values for total solids obtained in this way are naturally not so reliable as the results of direct determinations, since variations doubtless occur in the relative proportions of casein, albumin, and sugar in different samples of milk, whereas it is assumed in the above formula that they are invariably the same. In view, however, of the abundant confirmation which the formula has received when subjected to comparison with the results obtained by evaporation, it may safely be assumed that the values obtained for solids-not-fat are fairly accurate and

¹ The samples were taken by one of my senior students, Mr W. Bywater, and my thanks are due to him for the efficient manner in which this duty was discharged, and also for occasional assistance in carrying out the analyses. My thanks are also due to Mr H. W. Chendle for similar assistance in the last few weeks of the investigations.

sufficiently reliable for investigations of this nature, which postulate simply that the results shall be uniformly of the same order of accuracy, and therefore fairly comparable with each other.

On a few occasions, owing to the high temperature of the laboratory, some of the samples curdled before the completion of the analyses. In these cases the fluidity of the sample was restored by shaking with a few drops of strong ammonia, a corresponding slight correction being made in the results. To obviate this inconvenience, on a few days when the temperature was unduly high and rapid curdling of the milk was to be feared, a few drops of "preservative," in the form of a dilute ammoniacal solution of potassium chromate (as suggested and used by Mr Ingle, 'Trans.,' 1902, p. 286), were added to each sample.

In addition to the record of the individual milk-yields and the proportions of fat and solids-not-fat, a careful record was kept of the time at which each cow was milked (actually the time at which the milk was weighed), and the particular milker employed. In this way a check on the constancy of the interval between milkings and on the efficiency of the milker was established.

Notes were also made of the weather and of abnormalities in the health or disposition of any cow at milking time, and especially of periods of sexual excitement.

These notes, together with the daily records for each cow and for the Bulk samples, are given in the tables on pp. 307-325.

A cursory glance at these tables will suffice to show that the daily fluctuations in the composition of the milk, especially with reference to fat, have been fully as pronounced as in the previous investigations.

Plan of Investigations.

For several weeks previous to and during the first seventeen days of the experiment (*i.e.*, up to and including June 26th) each cow received daily a mixture of

2 lb. undecorticated cotton-cake,
2 lb. decorticated cotton-seed-meal,
1 lb. wheat-meal.

This ration was divided between the morning and evening milkings in proportions left to the discretion of the cow-men.

Assuming these foods to be of average quality,¹ it will be seen

¹ The following represent the average compositions of the foods used in these experiments:—

	Digestible protein per cent	Digestible carbohydrates per cent	Digestible fat per cent.
Undecorticated cotton-cake .	16	18	5
Decorticated cotton-seed-meal .	37	17	12
Wheat-meal	10	66	1.5
Maize meal	7.5	65	1.1

that the above diet is extremely nitrogenous, the proportion of nitrogenous to non-nitrogenous matter (calculated to the equivalent quantity of starch) being about 1:1.9. When the grass consumed by the cow whilst at pasture is taken into account, the ratio of albuminoid to non-albuminoid matter in the total food consumed daily would of course be considerably wider—the “nutritive ratio” of pasture grass being on the average about 1:7. The ratio would still, however, be considerably narrower than is usually regarded as most suitable for the feeding of dairy cattle.

It was thought inadvisable to make the diet *more* nitrogenous, and the change introduced was therefore in the nature of a reduction of the nitrogenous matter and a corresponding increase of the non-nitrogenous matter. This was effected by the substitution of 3 lb. of maize-meal for the cotton-seed- and wheat-meals. The total weight of food thus remained the same. The cotton-cake was retained in order that the change might not be too violent.

This change was first introduced at the evening milking on June 26, when the cows were divided into four groups. Care was taken that the cows of each group should be as nearly comparable as possible with regard to the period of lactation.

Group I. (Nos. 6, 8, 10, 14, and 15) were fed exactly as before.

Group II. (Nos. 2, 7, 17, 22, and 23) received daily

1 lb. undecorticated cotton-cake } at morning milking.
1 lb. maize-meal }

1 lb. undecorticated cotton-cake } at evening milking.
2 lb. maize meal }

Group III. (Nos. 4, 12, 18, and 20) received daily

2 lb. undecorticated cotton-cake } all at morning milking.
3 lb. maize-meal }

Group IV. (Nos. 5, 9, 11, and 19) received daily

2 lb. undecorticated cotton-cake } all at evening milking.
3 lb. maize-meal }

The change of diet thus affected only Groups II., III., and IV., Group I. continuing to receive the same treatment as heretofore. This group, therefore, served as a control group, and the results obtained from it are assumed to represent the normal changes taking place in the quantity and quality of the milk secretion due to advance of lactation and other influences concerning which very little is known, but which may be assumed to affect all the cows alike.

The cows of Group II. received their food in two unequal portions, the smaller one in the morning and the larger one at the evening milking, the quantities at each meal being roughly proportional to the day and night intervals between milkings.

The *mode* of feeding was thus with this group practically unchanged, and hence the results yielded by it when contrasted with the results from Group I. give an indication of the changes effected in the quantity and quality of the milk by the *change of diet*.

The treatment of Group III. differed from that of Group II. solely in that the concentrated food was given all at one meal—at the *morning* milking.

The results from this group, when contrasted with those of Group II., should, therefore, indicate the effect of giving all the concentrated food at the morning meal.

Similarly, by comparing the results from Group IV. with those of Group II. it was hoped that the effect of *evening* feeding with concentrated food would be evident.

The course of the experiment was marred by a failure of the supply of maize- and wheat-meals on July 5, owing to a breakdown in the grinding machinery, a readjustment of diet being thus necessitated for that day. The results obtained for several days succeeding this have been very carefully compared, and as no noticeable disturbance of the milk secretion can be detected, it is improbable that the value of the experiment was appreciably impaired by this unfortunate accident.

DISCUSSION OF RESULTS.

GROUP I. (*Control Group*).

The following tables (p. 275) epitomise the results obtained with this group. They give the mean daily values—morning and evening—for each cow as well as for the group, for each period of the experiment, the second period (35 days) being subdivided into a period of 21 days (the first 3 weeks) and 14 days (the last 2 weeks). In addition the means are given for the whole of the second period (35 days).

The gains in live-weight of these cows from July 1 to July 31 were—

Cow No.	lb.
6	32
8	32
10	50
14	22
15	48
Total gain	184
Average gain per cow	36·8

The results with these cows show that in the second period the morning yield diminished on the average by 3·2 lb. (or 26·4 per

MILK INVESTIGATIONS AT GARFORTH, 1903.

GROUP I.

CONTROL COWS.

YIELD.

Cow No.	First Period (June 10-20).		Second Period.				Whole of Second Period (June 27-July 31).	
			First three weeks (June 27-July 17)		Last two weeks (July 18-31)			
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
6	6.3	5.1	4.8	3.8	3.3	2.7	1.2	3.4
8	17.1	11.4	13.1	10.0	11.0	8.3	12.3	9.4
10	6.7	5.9	6.5	5.2	7.1	4.8	6.7	5.0
14	16.0	13.1	15.3	11.1	12.9	9.1	14.3	10.3
15	14.4	11.8	12.3	9.2	11.8	8.5	12.1	9.0
Mean	12.1	9.5	10.4	7.9	9.2	6.7	9.9	7.4

FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
6	3.00	3.84	3.27	3.74	3.36	4.03	3.31	3.85
8	2.75	3.60	2.38	4.41	2.75	4.05	2.53	4.27
10	3.30	3.78	3.71	3.72	3.85	3.97	3.78	3.82
14	2.74	4.20	2.82	4.31	3.23	4.73	2.98	4.48
15	2.36	3.60	2.67	3.02	3.04	3.66	2.82	3.64
Mean	2.83	3.83	2.98	3.06	3.25	4.09	3.08	4.01

SOLIDS-NOT-FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
6	8.40	8.35	7.99	7.94	7.66	7.99	7.86	7.96
8	8.77	8.71	8.52	8.42	8.56	8.57	8.54	8.48
10	9.09	8.92	8.80	8.83	8.94	8.89	8.86	8.86
14	9.03	8.85	8.82	8.66	8.68	8.61	8.77	8.64
15	8.69	8.51	8.48	8.51	8.73	8.66	8.58	8.57
Mean	8.80	8.67	8.52	8.47	8.51	8.54	8.52	8.50

cent) per cow, whilst the fat-content increased from 2.83 per cent to 3.08 per cent (or by 8.8 per cent), and the solids-not-fat decreased from 8.80 per cent to 8.52 per cent (or by 3.2 per cent). In the evening the milk-yield diminished by 2.1 lb. (or 22.1 per cent), the fat-content, however, increasing from 3.83 per cent to 4.01 per cent (or by 4.7 per cent), and the solids-not-fat decreasing from 8.67 per cent to 8.50 per cent (or by 2 per cent). If the morning and evening results be combined it will be seen that in the second period the daily milk-yield diminished on the average by 4.3 lb. (or 20 per cent) per cow, whilst the fat-content increased from 3.27 per cent to 3.48 per cent (or by 6.4 per cent), and the solids-not-fat decreased from 8.74 per cent to 8.51 per cent (or by 2.6 per cent).

During the same period the cows gained an average of 36.8 lb. in live-weight.

GROUP II.

Influence of Change of Diet.

The results obtained with this group are epitomised in the following tables (p. 277), which comprise the means for each cow and for the group for the whole of each period, and also separately the means for the first three weeks (June 27-July 17) and the last two weeks (July 18-31) respectively of the second period. In addition, the values obtained for the group are contrasted with the corresponding values which presumably would have been obtained had the changes in Group II. been solely of the same order as those affecting Group I. (the control group).

The changes in live-weight between July 1 and July 31 were—

Cow No.	lb
2	- 10
7	+ 24
17	+ 28
22	- 14
23	+ 22
<hr/>	
Total gain	+ 50
<hr/>	
Average gain per cow	+ 10
<hr/>	

Considering first the results obtained for the whole of the second period, it will be seen that the change from a highly nitrogenous diet to one relatively much poorer in nitrogen has resulted in the secretion of a rather greater quantity of milk, poorer, however, in fat, but practically unchanged with respect to its content of solids-not-fat, the indicated improvement of 0.03 per cent in the last mentioned being probably well within the limits of error in experimenting with such a small group. Indeed, in general,

GROUP II.

INFLUENCE OF CHANGE OF DIET.
YIELD.

Cow No.	First Period (June 10-26)		Second Period.				Whole of Second Period (June 27-July 31).	
			First three weeks (June 27-July 17).		Last two weeks (July 18-31).			
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
2	11.4	10.8	13.2	10.5	12.7	10.0	13.0	10.3
7	21.8	20.4	19.7	17.6	18.2	15.7	19.1	16.9
17	12.1	7.9	9.9	7.6	8.4	5.1	9.3	6.6
22	11.2	8.2	10.6	8.0	9.7	7.4	10.2	7.7
23	23.0	16.9	21.8	15.3	18.2	14.0	20.4	14.8
Mean	16.5	12.8	15.0	11.8	13.4	10.4	14.4	11.3
Calculated from Group I.			14.2	10.6	12.6	9.0	13.5	10.0
Increase (+) due to change of diet.			+0.8	+1.2	+0.8	+1.4	+0.9	+1.3

FAT.

	Per cent	Per cent.	Per cent	Per cent.	Per cent.	Per cent.	Per cent	Per cent.
2	2.95	4.07	2.83	4.58	3.02	4.73	2.90	4.64
7	2.26	4.39	2.33	4.26	2.37	4.20	2.35	4.23
17	2.37	3.19	2.14	3.49	2.35	3.39	2.22	3.45
22	3.21	4.15	3.24	4.19	3.58	4.24	3.38	4.21
23	2.86	4.11	2.84	4.13	2.79	4.38	2.82	4.23
Mean	2.73	3.98	2.68	4.13	2.82	4.19	2.73	4.15
Calculated from Group I.			2.87	4.12	3.13	4.25	2.97	4.17
Improvement (+) or deterioration (-) due to change of diet.			-0.19	+0.01	-0.31	-0.06	-0.24	-0.02

SOLIDS-NOT-FAT.

	Per cent	Per cent.	Per cent.	Per cent.	Per cent	Per cent	Per cent.	Per cent.
2	9.06	9.00	8.80	8.67	9.00	8.59	8.88	8.76
7	9.17	8.99	8.80	8.67	9.01	8.78	8.90	8.71
17	8.91	8.70	8.66	8.62	8.64	8.58	8.65	8.61
22	9.26	9.12	8.91	8.83	9.07	9.03	8.98	8.91
23	9.01	8.81	8.80	8.64	8.92	8.78	8.85	8.70
Mean	9.08	8.92	8.79	8.69	8.93	8.81	8.85	8.74
Calculated from Group I.			8.79	8.71	8.78	8.79	8.79	8.74
Improvement (+) or deterioration (-) due to change of diet.			0.00	-0.02	+0.15	+0.02	+0.06	0.00

too much stress must not be laid on the actual numerical results obtained in these experiments, since the groups are probably not large enough to ensure that the idiosyncratic variations of any particular cow shall not appreciably affect the mean values for the whole group. The results afford a striking confirmation of those obtained by Mr Ingle in 1901 with "Lot 3" (*vide* 'Trans.', 1902, pp. 295-297). The only apparent discrepancy is with respect to the solids-not-fat, which in the 1901 experiments decreased by 0.04 per cent, whereas in the present experiments a slight improvement (0.06 per cent in the morning milk) is indicated. As previously pointed out, however, it is possible that in the case of such insignificant changes as these the real results are obscured by the errors of experiment.

On contrasting the results obtained with the morning and evening milk respectively, it will be seen that the improvement in yield is more pronounced in the evening than in the morning milk. On the other hand, the deterioration in respect of fat is almost entirely confined to the morning milk. The apparent slight deterioration of fat in the evening milk may perhaps be due to the inclusion of cow No. 7, whose milk was actually poorer in fat during the second than during the first period, the reverse being the case with all the other cows.

If now the results obtained in the earlier and later portions respectively of the second period be contrasted, it is obvious that the changes in the quantity and quality of the milk during the three weeks immediately succeeding the change of diet were fully maintained during the fourth and fifth weeks,—the deterioration, indeed, in the case of the fat becoming actually more pronounced in the later stages.

It would appear, therefore, that the changes produced in milk by change of food are of a more or less permanent nature, no falling off in the amount of change being evident even after the lapse of several weeks.

Whether the accentuation of the deterioration with respect to fat during the last fortnight was normal or was due to abnormal fluctuations in the case of individual cows, it is scarcely possible to say. In view, however, of the shortness of the period and the great fluctuations often observed in the fat percentages, the latter alternative would appear the more probable. This point will be referred to again later (pp. 293-296).

The changes in live-weight of this group were less pronounced than with the cows of Group I., the average increase per cow for the month (July 1-31) being only 10 lb. It will be noted, however, that there was an actual decrease in live-weight in the case of cows Nos. 2 and 22. Apart, however, from these two cows the average gain is decidedly less than that of Group I.

The results for yield and fat obtained with this group are represented graphically in figs. 46 and 47, pp. 280, 281, along with the results for each individual cow included in the group. The mean values for each week during the second period are indicated by the points surrounded by small circles placed in the middle of the spaces corresponding to the different weeks. For convenience of reference these points have been connected by a continuous line. It must be borne in mind, however, that it is by no means certain that the changes take place in the gradual and regular manner implied in such continuous curves.

The points surrounded by small circles on the dotted line represent the corresponding values calculated on the assumption that only changes of the same order as those affecting Group I. had taken place. For the sake of clearness the diagram representing the mean results for the whole group is drawn on a slightly larger scale than those referring to the individual cows.

The relative situations of the corresponding points marked on each curve reveal at a glance the nature of the changes produced by the change of diet. In the case of the *yield* (fig. 46) it will be seen that the changes recorded with the individual cows are uniformly in the same direction, with the exception of the morning milk of cow No. 17, where an increase in the yield is indicated only in the first week of the second period, the milk-yield throughout the rest of the experiment diminishing at a rather more rapid rate than was the case with the control cows (Group I.) It will be noted also in the case of the evening milk of the same cow that the difference between the observed and calculated yields is only very slight. With all the other members of the group it will be noted, however, that there is an immediate increase in the means after the change of food, as compared with the calculated means, and, moreover, that the increase is well maintained throughout.

In the case of the *fat* (fig. 47) it will be seen that the agreement between the individual cows is not quite so pronounced as with the yields. In view of the great fluctuation in the fat-content, especially of evening milk, this is not surprising. On the whole, however, the results yielded by the individual cows bear out well the indications of the group means,—the only notable discrepancies being in the evening milk of cows Nos. 22 and 23. The changes in the case of the solids-not-fat are too small to admit of convenient graphic representation.

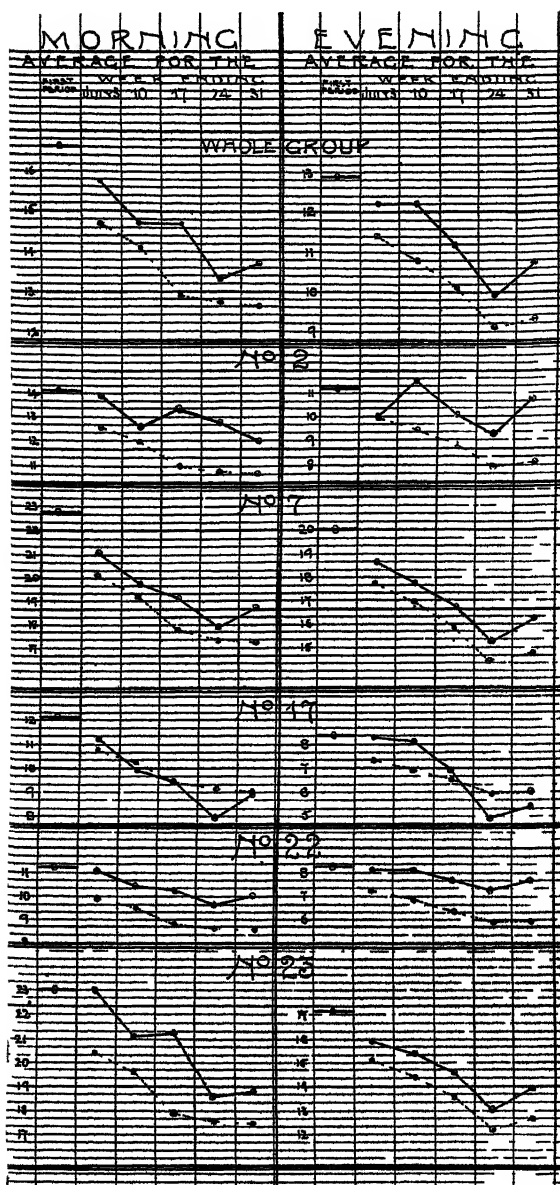


Fig 46—GROUP II. YIPID

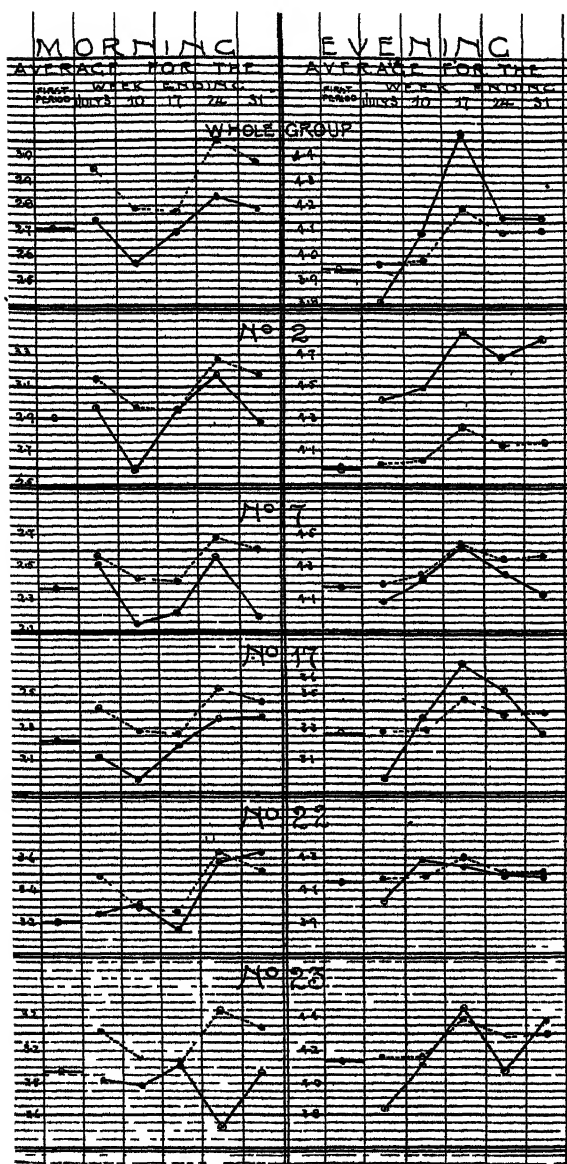


Fig. 47.—GROUP II. FAT.

GROUP III.

Influence of Morning Feeding.

The results obtained with this group are epitomised in the following tables (p. 283). The treatment of these cows differed from that of Group II. merely in that the concentrated food, instead of being distributed between two meals, was all given at the morning milking. A comparison of the results from these groups should therefore reveal the influence, if any, of the difference in the *mode* of feeding. Accordingly in the tables, along with the mean values obtained for Group III., the corresponding values calculated on the assumption that only changes such as affected Group II. had taken place, are given. The differences between the two sets of values should then represent the effects of morning feeding.

The changes in live-weight between July 1 and July 31 were—

Cow No	lb.
4	-18
12	+17
18	+20
	<hr/>
Total gain	+19
	<hr/>
Average gain per cow .	+6.3

Cow No. 20, which was also included in this group, could not be weighed on July 31, owing to an accident. It will be seen that here again, as was the case with Group II., the gain of live-weight is decidedly less than with the cows receiving the highly nitrogenous diet (Group I.)

Turning now to the tables on p. 283, and considering first the results for the whole of the second period, it would appear that the morning feeding resulted in a slight diminution of the milk-yield (A.M. 0.1 lb.; P.M. 0.5 lb.), an increase of the fat-content of both morning and evening milk (A.M. 0.12 per cent; P.M. 0.19 per cent), and only a very slight change in the solids-not-fat.

These results are in accordance with those obtained by Mr Ingle in his 1902 experiments ('Trans.,' 1903, p. 154), the increase of the fat-content in those experiments being most marked in the morning milk, but evident also in the evening milk, though Mr Ingle—presumably through an oversight—refers to the change as a diminution. On referring to the results with the individual cows as contrasted with the mean results for the control group ('Trans.,' 1903, p. 161), it will be seen that the apparent improvement in the evening milk is due

GROUP III.

INFLUENCE OF MORNING FEEDING.

YIELD.

Cow No.	First Period (June 10-26).		Second Period.				Whole of Second Period (June 27-July 31).	
			First three weeks (June 27-July 17)		Last two weeks (July 18-31).			
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
4	20.3	16.4	19.4	13.3	17.3	11.5	18.6	12.6
12	18.5	14.0	16.8	12.9	14.5	10.3	15.9	11.9
18	7.4	5.1	5.5	5.5	5.1	4.4	5.3	5.1
20	12.9	10.4	11.7	9.2	10.9	8.5	11.4	9.0
Mean	14.8	11.5	13.3	10.2	12.0	8.7	12.8	9.6
Calculated from Group II			13.5	10.6	12.0	9.3	12.9	10.1
Diminution (-) due to morn- ing feeding.			-0.2	-0.4	0.0	-0.6	-0.1	-0.5

FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
4	3.07	4.10	3.36	4.11	3.43	4.66	3.39	4.33
12	2.64	3.84	2.63	3.92	2.76	3.89	2.68	3.91
18	3.43	3.75	3.06	4.56	3.38	4.43	3.19	4.51
20	2.56	3.73	2.88	3.97	2.98	4.14	2.92	4.03
Mean	2.92	3.85	2.98	4.14	3.14	4.28	3.04	4.20
Calculated from Group II			2.87	4.00	3.02	4.05	2.92	4.01
Improvement (+) due to morning feeding.			+0.11	+0.14	+0.12	+0.23	+0.12	+0.19

SOLIDS-NOT-FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
4	9.10	9.02	8.79	8.69	8.86	8.85	8.82	8.75
12	8.76	8.51	8.39	8.28	8.35	8.21	8.38	8.25
18	8.91	8.73	8.64	8.54	8.74	8.69	8.68	8.60
20	8.92	8.84	8.64	8.65	8.86	8.89	8.72	8.74
Mean	8.92	8.78	8.61	8.54	8.70	8.66	8.65	8.58
Calculated from Group II			8.63	8.55	8.77	8.67	8.69	8.59
Deterioration (-) due to morning feeding.			-0.02	-0.01	-0.07	-0.01	-0.04	-0.01

almost entirely to one cow, No. 20. It is necessary, therefore, to consider more closely the results with the individual cows in the present experiment. The following table shows the effect of the change in time of feeding on the fat-content of the evening milk of each individual cow:—

Cow No.	Observed per cent.	Per cent calculated from Group II.	Improvement (+) or deterioration (-) due to morning feeding. Per cent.
4	4.33	4.27	+0.06
12	3.91	4.00	-0.09
18	4.51	3.91	+0.60
20	4.03	3.89	+0.14

It is thus evident that the apparent marked improvement in the evening milk is due very largely to one cow, No. 18, as a partial offset to which we have the slight deterioration in the milk of No. 12. It would appear on the whole, therefore, that the morning feeding had produced only a very slight improvement in the evening milk. The question, however, can only be answered satisfactorily by experiments either with larger groups or extending over longer periods, since the fluctuations in the fat-content are especially noticeable in the evening milk.

On comparing the results given in the tables (p. 283) for the first three weeks and the last fortnight respectively of the second period, it will be seen that the changes are, on the whole, fully maintained throughout the whole of the period.

The results with respect to yield and fat obtained with this group, and the individual cows composing it, as expressed by the weekly means during the second period, are graphically represented in the diagrams, figs. 48 and 49, pp. 285, 286: the observed means being connected by a continuous line, and the means calculated on the assumption that only influences such as affected Group II. were at work by a dotted line in each case.

It will be seen that in the case of the milk-yields (fig. 48) there are in the morning results considerable variations from the group means in the case of individual cows, notably No. 4, so that it is doubtful whether one would be justified in attaching any importance to the group results. In the evening milks, however, the agreement between the individual cows is much better, only No. 18 giving results notably at variance with the group means.

In the case of the weekly means for fat (fig. 49) it will be noted that in the morning milks only No. 18 gave results at variance with the mean indications of the group. In the evening milks, however, it will be seen that the enrichment appar-

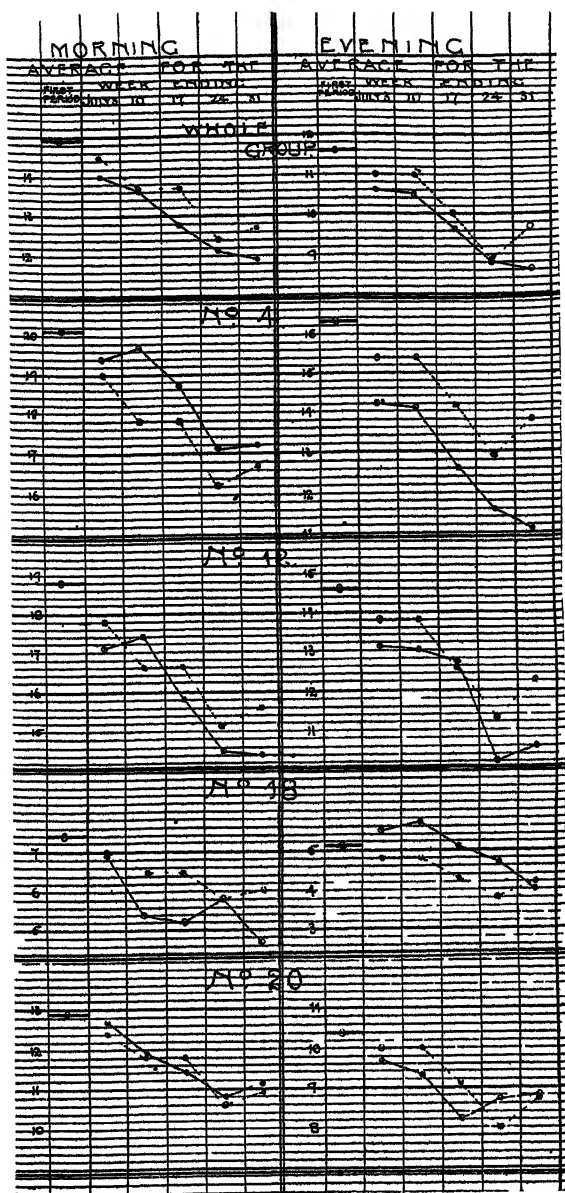


Fig 48.—GROUP III. YIELD.

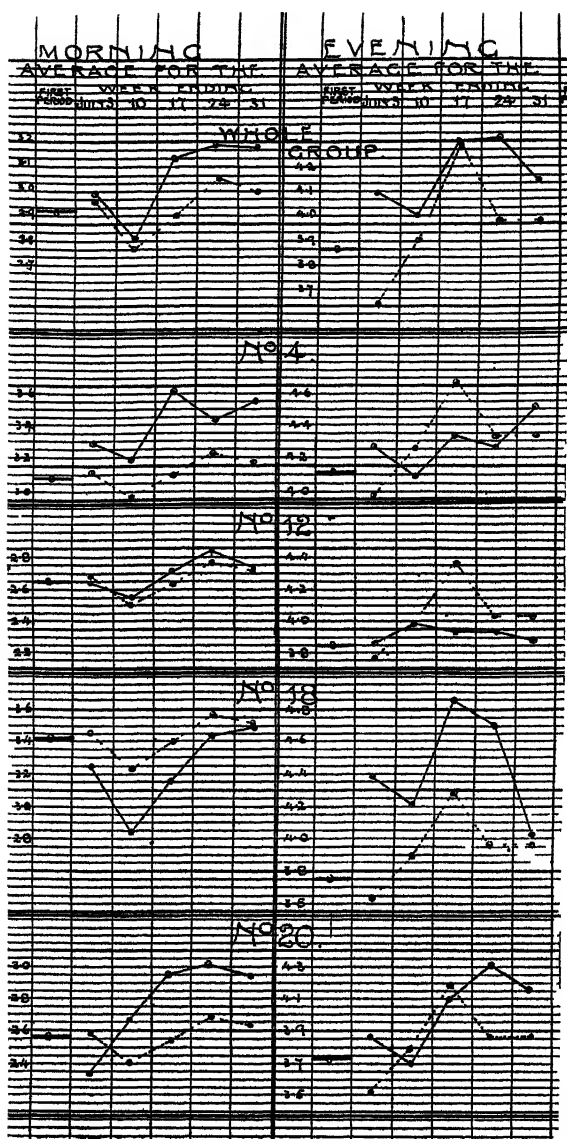


Fig. 19.—GROUP III F.VI

ent in the mean results for the whole group is, as already pointed out, attributable almost entirely to one cow, No. 18, although, indeed, there is in every case a decided enrichment of the milk during the first week of the second period as compared with the results yielded by the control group during that period.

GROUP IV.

Influence of Evening Feeding.

As with Group III., the treatment of this group differed from that of Group II. solely in the giving of the food all at one meal,—in this case at the *evening* milking. Hence a comparison of the results with those yielded by Group II. should reveal the influence of the evening feeding. Such a comparison is, therefore, included in the following tables (p. 288), which epitomise the results obtained with this group.

The changes in live-weight between July 1 and July 31 were as follows :—

Cow No.	lb
5	+36
9	-36
11	+26½
19	0
Total gain	+26
Average gain per cow	+6 5

Although there is a net average gain in live-weight of 6·5 lb. per cow, it will be seen that there is considerable variation amongst the individual cows, No. 9 actually losing in weight by 36 lb.

On examining the tables on p. 288, and confining our attention first to the results for the whole of the second period, it will be seen that the evening feeding caused a slight diminution in the milk-yield both in the morning and evening (A.M. 0·3 lb.; P.M. 0·4 lb.), and an improvement of 0·15 per cent of fat in the morning milk, whilst in the evening milk there was practically no change in the fat-content as compared with Group II., the recorded diminution amounting to only 0·04 per cent. The solids-not-fat underwent practically no change.

The results thus resemble closely those observed with morning feeding (Group II.), even the actual magnitudes of the changes observed being strikingly similar. As already pointed out, however, too much significance must not be attached to the actual numerical values obtained.

The results obtained during the second period with each

GROUP IV.

INFLUENCE OF EVENING FEEDING.

YIELD.

Cow No.	First Period (June 10-20).		Second Period.				Whole of Second Period (June 27-July 31).	
			First three weeks (June 27-July 17).		Last two weeks (July 18-31).			
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
5	12.4	8.0	10.7	8.2	9.6	7.6	10.3	7.9
9	16.3	12.7	15.1	10.2	13.0	9.6	14.2	10.0
11	14.3	10.7	14.0	9.5	12.8	8.5	13.5	9.1
19	21.2	17.0	18.4	14.9	14.7	12.1	16.9	13.3
Mean	16.1	12.1	14.5	10.7	12.5	9.4	13.7	10.2
Calculated from Group II.			14.6	11.2	13.1	9.8	14.0	10.6
Diminution (-) due to evening feeding.			-0.1	-0.5	-0.6	-0.4	-0.3	-0.4

FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
5	3.17	4.16	3.29	4.18	3.38	4.44	3.33	4.28
9	2.66	3.77	2.75	3.78	2.95	4.22	2.83	3.96
11	2.84	3.84	3.05	3.83	3.08	3.94	3.06	3.87
19	2.54	4.49	2.54	4.71	2.70	4.65	2.61	4.69
Mean	2.80	4.07	2.91	4.12	3.03	4.31	2.96	4.20
Calculated from Group II.			2.75	4.22	2.89	4.28	2.81	4.24
Improvement (+) or deterioration (-) due to evening feeding.			+0.16	-0.10	+0.14	+0.03	+0.15	-0.04

SOLIDS-NOT-FAT.

	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
5	9.00	8.94	8.81	8.78	8.89	8.75	8.84	8.77
9	8.70	8.63	8.46	8.41	8.58	8.55	8.51	8.47
11	9.15	9.01	8.95	8.81	9.20	8.93	9.05	8.87
19	9.13	8.93	8.84	8.68	8.85	8.69	8.85	8.68
Mean	9.00	8.88	8.76	8.68	8.88	8.73	8.81	8.70
Calculated from Group II.			8.71	8.67	8.85	8.75	8.77	8.70
Improvement (+) or deterioration (-) due to evening feeding.			+0.05	+0.01	+0.03	-0.02	+0.04	0.00

individual cow with respect to the fat-content of the morning and evening milk are summarised in the following table:—

Cow No.	MORNING.			EVENING.		
	Fat, per cent		Change due to evening feeding.	Fat, per cent		Change due to evening feeding
	Observed.	Calculated from Group II.		Observed.	Calculated from Group II.	
5	3.33	3.17	+0.16	4.28	4.34	-0.06
9	2.83	2.66	+0.17	3.96	3.93	+0.03
11	3.06	2.84	+0.22	3.87	4.00	-0.13
19	2.61	2.54	+0.07	4.69	4.68	+0.01
Mean	2.96	2.81	+0.15	4.20	4.24	-0.04

It will be observed that the results are wonderfully uniform in the case of the morning milk, the improvement being marked with each individual cow. The evening results are not so decisive, but, with the exception of No. 11, the changes observed are very small, so that we are probably justified in saying that the effect of evening feeding on the fat-content of the evening milk is negligible.

In the experiment of a similar nature carried out by Mr Ingle in 1902 ('Trans.,' 1903, p. 161) the results obtained were apparently not thought to warrant any definite conclusions. It is of interest, however, to analyse those results by the method employed in the investigations just described.

The following table contains, therefore, the results for fat

Cow No.	MORNING.			EVENING.		
	Fat, per cent.		Change due to evening feeding	Fat, per cent		Change due to evening feeding.
	Observed	Calculated from Control Group.		Observed.	Calculated from Control Group.	
5	2.46	2.01	+0.36	4.61	4.52	+0.09
12	2.70*	2.42	+0.28	3.82	3.52	+0.30
13	2.75	2.48	+0.27	4.55	4.39	+0.16
19	2.32	1.79	+0.73	4.30	2.85	+1.45
Mean	2.61	2.18	+0.43	4.32	3.82	+0.50

* Wrongly given as 2.83 on p. 161 of 'Transactions' for 1903.

obtained by Mr Ingle, in what he terms the "Second Period," with the cows (Group III., Nos. 5, 12, 13, 19) which during this period received all their dry food at night,—these results being given in the lower table on p. 161 of the 'Transactions' for 1903. The values "calculated from Control Group" in the table on p. 289 are calculated from the results for the "First Period" on the assumption that only normal changes had occurred, such as *ex hypothesi* are the only changes occurring in the Control Group—the values for which are taken from the upper table on p. 161 of the 'Transactions' for 1903. The results thus indicate a remarkable improvement in both the morning and the evening milk, even when the obviously abnormal values yielded by No. 19 are omitted, and thus tend to the same conclusion as the experiment dealt with in the present paper, though in the latter the changes are not quite so pronounced.

Referring back again to the tables on p. 288, and comparing the results obtained for the first three weeks and the last fortnight respectively of the Second Period, it will be seen that with this group also, as with Groups II. and III., the changes produced are, on the whole, fully maintained throughout the experiment.

The results with respect to yield and fat obtained with this group, and each individual cow included in it, as expressed by the weekly means during the second period, are graphically represented in the diagrams, figs. 50 and 51, pp. 291, 292: the observed means, as in the previous diagrams, being connected by a continuous line, whereas the means calculated from Group II. are connected by a dotted line.

Here again, as with Group III. (fig. 48), in the case of the yields (fig. 50) the indications of the individual cows are extremely irregular, so that it would be unwise to place any reliance on conclusions drawn from the group means. The fat results (fig. 51) are more satisfactory in this respect, although here also the regularity is far from absolute.

Indeed a survey of the whole of the diagrams (figs. 46 to 51) will indicate even to the most casual observer the great influence of the individuality of each cow on the results of experiments carried out on such a small scale as the present. The group results can obviously only then be made the basis of generalisations when they are confirmed in the individual results obtained with a majority of the cows composing the group. Owing to the lack of this confirmation by the individual cows, no generalisations are made in the present paper with respect to the influence of morning or evening feeding on the milk-yield (Groups III. and IV.)

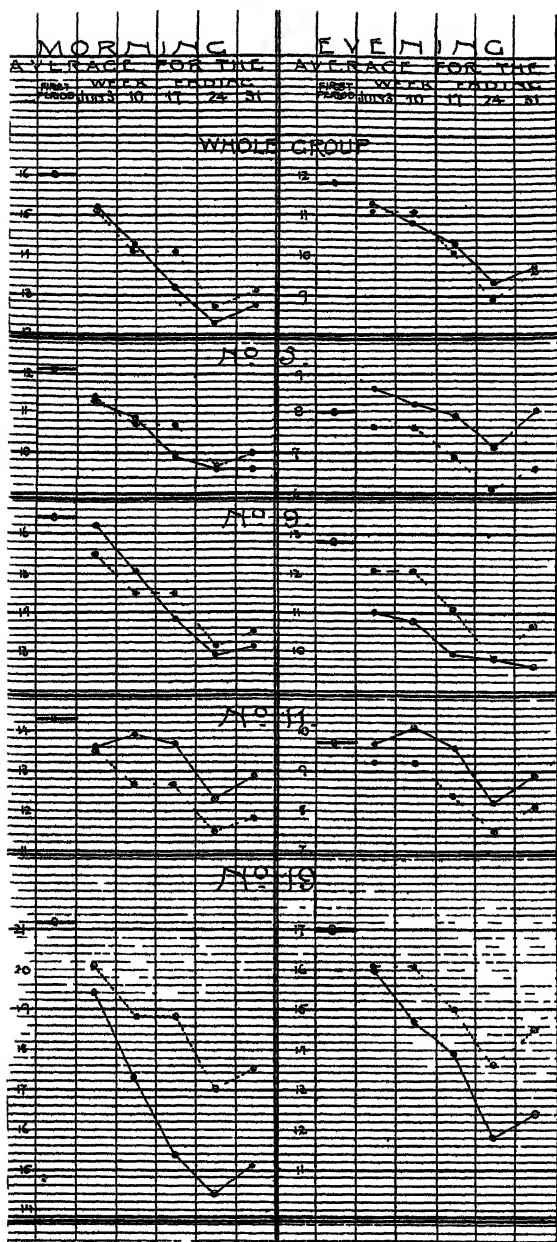


Fig 50—GROUP IV. YIELD.

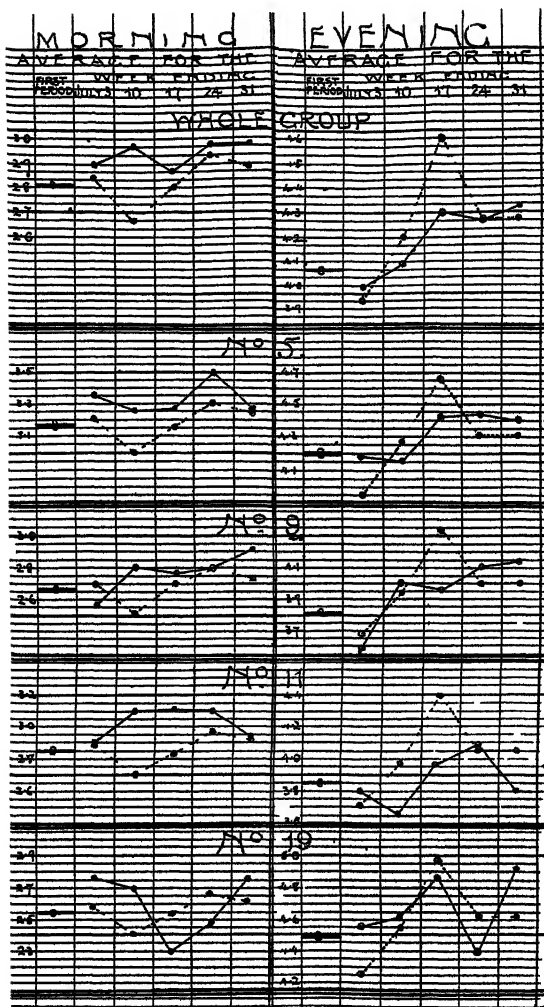


Fig. 51.— GROUP IV. FAT.

A summary of the conclusions drawn from the foregoing experiments is given on p. 305 ((1), (2), (3), and (4)).

Influence of Abnormal Fluctuations on the Results.

In the foregoing, the data contained in the tables have been obtained by including all values obtained with the individual cows during the course of the experiment.

If, however, the tables containing these values on pp. 307-324 be studied, it will be quickly apparent that in various instances remarkable fluctuations occurred with individual cows, which were obviously not due in particular to the change of diet or treatment since they were not simultaneously displayed by the other cows. This was markedly the case during periods of sexual excitement. Thus, for instance, on June 26 cow No. 7 was in "season," and at the morning milking yielded only 7 lb. of milk containing only 1.55 per cent of fat, whereas it had yielded up to that date on the average each morning well over 20 lb. of milk containing over 2.2 per cent of fat. The effects were still pronounced in the evening milk on the same day and also in the milk of the following morning. Other striking abnormalities of a similar nature are to be observed—*e.g.*, on June 18 with cow No. 14, on June 28 with cow No. 20, and on July 3 with cow No. 4.

Obviously, therefore, the results obtained with the different groups would be a more precise indication of the effects of the changes in treatment if these values which may be regarded as abnormal could be eliminated. In any attempt of this nature we are, however, confronted with two difficulties—*viz.*, the difficulty of detecting these abnormalities, since even the values which must be regarded as normal often show very considerable fluctuations (this being especially marked in the case of the fat-content), and the further difficulty of fixing the period over which the abnormal influence extends. These difficulties preclude any attempt at a really satisfactory elimination of abnormal values, and indeed are so great that it is questionable whether any such attempt whatever is advisable.

Whilst preferring, therefore, the results obtained without any such elimination, the author has thought it of interest to record the alterations in the averages for the groups produced by leaving out those values which in his opinion are decidedly abnormal,—those, namely, which in the tables on pp. 307-324 are marked with an asterisk (*).

The results are summarised in the following tables.

TABLES OF RESULTS OBTAINED AFTER ELIMINATION
OF ABNORMAL VALUES.

GROUP I.

	Yield		Fat		Solids-not-fat	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
First period	12.4	9.4	2.85	3.88	8.79	8.65
Second { First 3 weeks	10.4	7.9	2.98	4.00	8.51	8.47
period { Last 2 weeks	9.4	6.7	3.21	4.05	8.52	8.56
Mean of whole of second period .	10.0	7.4	3.07	4.02	8.51	8.51

GROUP II.

	Yield.		Fat.		Solids not-fat.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
First period	16.6	12.9	2.71	3.94	9.09	8.96
Second { First 3 weeks	15.2	11.8	2.66	4.09	8.79	8.67
period { Last 2 weeks	13.5	10.3	2.81	4.15	8.94	8.81
Mean of whole of second period .	14.5	11.2	2.72	4.11	8.85	8.73

EFFECT OF CHANGE OF DIET* (deduced from comparison with
Group I., see p. 276).

		Second period.		Whole of second period.
		First 3 weeks	Last 2 weeks.	
Yield . . .	{ A.M.	+1.3 lb.	+0.9 lb	+1.1 lb.
	{ P.M.	+1.0	+1.1	+1.0
Fat . . .	{ A.M.	-0.17 %	-0.24 %	-0.20 /
	{ P.M.	+0.03	+0.04	+0.03
Solids-not-fat	{ A.M.	-0.01 %	+0.13 %	+0.05 %
	{ P.M.	-0.10	-0.06	-0.08

GROUP III.

	Yield.		Fat		Solids-not-fat.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.
First period	14.8	11.7	2.92	3.86	8.92	8.76
Second period {	First 3 weeks	13.5	10.3	2.99	4.11	8.63
	Last 2 weeks	11.9	8.7	3.18	4.22	8.65
Mean of whole of second period .	12.9	9.6	3.07	4.10	8.66	8.58

EFFECT OF MORNING FEEDING (*deduced from comparison with Group II.*)

		Second period.		Whole of second period.
		First 3 weeks	Last 2 weeks.	
Yield . . . {	A.M.	0.0 lb.	-0.1 lb.	0.0 lb.
	P.M.	-0.4	-0.6	-0.5
Fat . . . {	A.M.	+0.12 %	+0.15 %	+0.13 %
	P.M.	+0.10	+0.15	+0.12
Solids-not-fat {	A.M.	0.00 %	-0.07 %	-0.03 %
	P.M.	+0.05	+0.04	+0.05

GROUP IV.

	Yield		Fat.		Solids not-fat.	
	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
	lb.	lb.	lb.	lb.	lb.	lb.
First period	16.0	12.2	2.81	4.06	9.00	8.88
Second period {	First 3 weeks	14.6	10.9	2.91	4.13	8.77
	Last 2 weeks	12.5	9.5	2.97	4.29	8.89
Mean of whole of second period .	13.8	10.3	2.94	4.19	8.82	8.69

EFFECT OF EVENING FEEDING (*deduced from comparison with Group II.*)

		Second period.		Whole of second period.
		First 3 weeks.	Last 3 weeks.	
Yield . .	{ A.M.	0.0 lb.	-0.5 lb.	-0.2 lb.
	{ P.M.	-0.2	-0.2	-0.2
Fat . .	{ A.M.	+0.15 %	+0.05 %	+0.10 %
	{ P.M.	-0.08	+0.01	-0.04
Solids-not-fat	{ A.M.	+0.07 %	+0.04 %	+0.06 %
	{ P.M.	+0.08	0.00	+0.05

On comparing these values with those given in the tables on pp. 275, 277, 283, 288, it will be seen that the changes in the means for the groups brought about by the elimination of these abnormal values are in every case only very slight, and in no case do they necessitate any modification in the conclusions already drawn as to the influence of the change of diet, of morning and of evening feeding respectively.

From this one may legitimately conclude that the experiment has been conducted on a sufficiently large scale to render the mean results practically unaffected by the occasional abnormalities such as may reasonably be expected with the individual cows.

It should be mentioned here also, that in calculating the weekly means for the diagrams, figs. 46-51, pp. 280, 281, 285, 286, 291, 292, the values regarded as abnormal have been omitted, since, obviously, in so short a period as seven days the effect on the mean of the inclusion of such abnormal values would be so great as to impart an entirely misleading character to the diagram.

Influence of Sexual Excitement on Milk Secretion.

According to the records which are included in the tables on pp. 307-324, every cow, with the possible exception of Nos. 8 and 10, was at some period or other during the experiment in a condition of sexual excitement, and the opportunity may therefore be utilised for gleanings such information as is afforded of the influence of this condition on the quantity and quality of the milk secreted.

The influence seems to be much more pronounced with some

cows than with others—*e.g.*, very marked changes are observable in the milk of Nos. 4, 7, 14, and 20, whilst with Nos. 9, 17, 19, 22, and 23 very little change is noticeable in either the quantity or the quality of the milk produced.

The effects are, as a rule, most pronounced on the *yield*, which in general at first shows a marked diminution, followed at the next milking by a yield well above the average. This is distinctly noticeable in the case of Nos. 4 (July 3 and 4), 7, 14, 15, 18, 20, 22—the results not being so decisive in other cases.

The diminution in yield is usually, at the first milking after the cow comes in “season,” accompanied by a lowering of the *fat*-content, followed at the next milking sometimes by an abnormally high and sometimes by an abnormally low fat-content, though this is not invariably the case. This is most clearly shown by Nos. 4, 6, 7, 14, 15, 19, 20. With the majority of the remaining cows no marked deviations from the mean are recorded.

No generalisations with respect to the influence on *solids-not-fat* can be made, the changes being in most cases within the ordinary limits of fluctuation.

With respect to the period over which the influence extends, it is naturally difficult to obtain definite information. It would appear, however, from a careful study of the data, that in most cases the effect is not appreciable after the two succeeding milkings subsequent to the cow coming in “season.” Still in a few cases, notably with Nos. 7, 11, 12 (June 14 and 15), 14, and 19, it is apparent in at least three successive milkings. Of course one would naturally expect to find considerable difference between different cows in this respect.

One further fact, which may be of significance, remains to be noted—*viz.*, that in nearly every case the fat-content of the milk is decidedly above the average on the two or three days immediately preceding the period of active sexual excitement.

Influence of Milker.

In the great majority of cases the cows were milked by experienced milkers, but, for teaching purposes, it was necessary to allow the dairy students to have occasional access to the cows at the evening milking. Most of these, however, were also experienced milkers, so that it is scarcely probable that any appreciable error can have been introduced in this respect, especially since precautions were taken in every case to ensure that the udder was completely stripped before the milk was mixed and sampled.

From the diversity of milkers employed one might expect any effect of the individuality of the milker to be apparent in the results. On a very careful scrutiny of the data no such effect can, however, be detected, so that it would appear as if efficiency in milking were the only requisite for satisfactory extraction of the milk.

Influence of Climate.

As already stated, the cows were at pasture day and night for several weeks previous to and throughout the whole of the experiment, and were thus fully exposed to all changes of climate, no shelter being available other than that furnished by the hedges. With a view, therefore, to studying the influence of the climate on the milk secretion a weather record was kept, which is reproduced, alongside the data obtained with the "Bulk" samples, in the table on p. 325.

A survey of the general weather conditions throughout the period of the experiment is afforded by the following extract from notes on the weather compiled by Mr E. P. Kaye, B.Sc., from the records taken at Garforth for the Meteorological Society:—

June.—There was practically no rain registered from May 14th to June 13th, then there was more than 1 in. in 3 days, and another wet period from the 24th to the 27th, the total (1·68 in.) for the month being practically the same as for December and January. The sun shone for 166 hours, the brightest days being the 3rd, 8th, 22nd, 28th, and 29th. The 1st was the warmest day. The thermometer was below freezing-point on the nights of the 20th, 21st, and 22nd. The 2nd and 4th were very windy.

July.—Not so sunny as June, though the 9th was the brightest day in the year (13·2 hours). Sun thermometer registered 141° Fahr. Other days of over 10 hours sunshine were the 1st, 3rd, 7th, 10th, and 31st. Rainfall nearly 3 inches, mostly in the middle of the month. The coldest night was the 6th (34° Fahr.)

It will be noted that the most adverse climatic conditions obtained during the wet periods, June 13-15 and June 24-27, and on the nights of June 20-21, 21-22, 22-23, and July 6-7. On the other hand, the conditions were most congenial during the periods June 28 to July 3, and July 7-10. It might be expected, therefore, that if changes of climate have any appreciable effect on the milk secretion, it would be particularly apparent during these periods, and especially perhaps during the period June 21 to 23, when the alternations of temperature between day and night were most pronounced. It must be admitted, however, that no such influence is apparent in the results obtained with the bulk samples.

Attention may, however, be directed to a few points of special interest.

Thus, on June 14, although rain had fallen incessantly since noon of the previous day and continued uninterruptedly throughout the 14th, the milk-yield was well maintained both morning and evening, and the fat-content of the evening's milk was decidedly above the average. This improvement was, however, not necessarily due directly to the weather, since, as recorded in the weather notes, this was practically the first fall of rain registered since the middle of May. The change in the milk might, therefore, with equal justice be ascribed to the increased succulence of the grass. Still, to whatever cause it may actually be due, it is significant that on nearly every occasion, after a decidedly wet night, the quality of the morning milk was well up to, if not above, the average. This was well shown on June 25, 27, July 3, 5, 12, 16, 18, 22, 24, 26, and 28, but was not very obvious on June 16, July 11 and 15, nor is any regularity apparent in the variations of quality of the evening samples.

Attention may also be directed to the improvement in the morning milk coincident with the warm period June 24–July 3, the average fat-content during this period being 2.91 per cent as contrasted with 2.76 per cent during the previous 14 days, the improvement being most pronounced on the three very warm days, June 27, 28, and 29. The average fat-content of the evening milk during the same period (4.13 per cent) is also appreciably higher than that for the previous period (4.02 per cent). No regular improvement from day to day is, however, traceable, and, moreover, no such improvement is noticeable during the subsequent warm period, July 7–11,—the high fat-content of the evening milk on July 11 being more probably due to the shorter period than usual between the morning and evening milkings than to any climatic influences.

The lack of regularity in the fluctuations in the quality of the *mixed milk of the herd* with variations of climate would seem to indicate that, if climatic influences do affect the milk-secretion,—as is universally held to be the case,—then the effects must be widely different with different cows. Assuming that the changes recorded are due mainly to changes of climate, it was found on comparing the *records for the individual cows* that this was the case.

The mode of procedure adopted to effect this comparison consisted in tabulating for each day the number of cows whose milk showed a fat-content either clearly above or below the average for the particular period of the experiment in which

each day occurred. In this way the following table was drawn up—the weather notes being included for convenience of reference:—

DATE.	MORNING.		NOTES ON WEATHER.	EVENING.	
	Above	Below		Above	Below
June.					
10	5	7	Dull morning after rather cold night. Later fine . . .	4	8
11	6	5	Dull morning after rather cold night. Strong wind . . .	1	11
12	10	5	Dull day . . .	7	10
13	7	9	Morning dull and cool. Heavy rain after 11 A.M. . .	3	11
14	6	4	Rain continuous from 13th. Very cold wind . . .	12	8
15	8	5	Light rain during early morning. Fine towards noon . . .	3	11
16	4	7	Rain during night. Fine sunny day . . .	6	7
17	7	8	Morning fine. Rain during afternoon . . .	6	8
18	3	11	Fine day, but rather cool . . .	12	2
19	3	8	Cold morning after very cold night . . .	7	7
20	9	8	Fine cold day after cold night . . .	6	10
21	5	9	} Sharp frost during night. Fine bright day . . . }	7	9
22	6	11		9	6
23	8	6		7	8
24	6	7	Fine warm day . . .	8	6
25	11	3	Rain during night. Thunderstorm in afternoon. Warm . . .	7	4
26	5	8	Rain all day. Warm . . .	11	5
27	9	4	Heavy rain during night. Fine warm day . . .	3	11
28	9	4	Fine warm day after warm night . . .	6	5
29	7	5	Fine warm day. Strong westerly wind . . .	9	5
30	11	4	Fine warm day . . .	2	12
July.					
1	6	5	Slight rain during previous evening. Fine hot day . . .	2	13
2	6	9	Fine hot day . . .	5	7
3	8	4	Heavy rain during previous night. Fine day. Strong westerly wind . . .	9	3
4	6	8	Cool night and morning. Afternoon fine and warm . . .	7	8
5	9	7	Gale and heavy rain during night . . .	8	7
6	6	8	Rain previous evening. Cold night. Dull cold day. Strong wind . . .	12	5
7	4	11	Fine day. Northerly wind . . .	3	12
8	2	10	Fine day. Slight rain at mid-day . . .	7	8
9	4	9	Fine hot day—the brightest of the year . . .	3	12
10	6	6	Fine hot day after warm night . . .	7	9
11	7	7	Dull showery day after warm night. Thunderstorm during night . . .	14	2
12	7	6	Morning dull. Afternoon fine. Heavy thunderstorm during late afternoon and evening of 11th. . .	5	11
13	12	1	Cooler during night. Cold day, with rain during afternoon . . .	5	8
14	6	8	Very dull, close day, with showers . . .	12	2
15	4	8	Rain continuous since 14th up to early morning; then fair but dull. Afternoon close . . .	11	5
16	9	4	Dull and showery. Rain during night . . .	12	5
17	8	7	Morning fine. Thunder during afternoon but no rain. Air close and oppressive . . .	11	6
18	5	9	Heavy rain during night. Dull cold day. Northerly wind . . .	7	9
19	11	3	Dull cold day . . .	5	10
20	6	11	Fine warm day after dull cool morning . . .	11	6
21	8	4	Morning fine and warm. Rain during afternoon . . .	7	8
22	11	5	Very heavy rain during night. Morning showery. Afternoon warm and bright . . .	5	11
23	8	8	Fine warm day . . .	7	10
24	8	8	Rain during night. Dull morning . . .	16	1
25	9	7	Fine hot day . . .	7	10
26	10	2	Heavy rain during night and morning. Afternoon fine . . .	11	4
27	3	11	Cool day after cold night. Rain during afternoon . . .	6	10
28	6	7	Heavy rain during night. Fine day . . .	9	6
29	5	9	Thunderstorm about 11 A.M. Afternoon fine . . .	3	8
30	4	9	Morning wet. Afternoon fine . . .	3	9
31	4	9	Fine warm day . . .	7	8

Of course, in arriving at these figures only values were taken into account which diverge decidedly from the means, and

such abnormal values as might reasonably be considered to be the result of accidental influences, such as sexual excitement, were not taken into account.

On examining the above table, it will be seen that the first feature of note is displayed in the evening milks of June 11, when no fewer than 11 cows yielded milk of less than average fat-content,—only one cow (No. 8) yielding milk of higher quality than the average for the period. This phenomenon is perhaps attributable to the gale which raged on that day (compare, however, with July 3 and 5). With the dying down of the gale during the night, and consequent increased comfort of the cows, a tendency in the reverse direction is observable in the morning milks of June 12, ten of which, it will be noted, were above the average, as against five below.

Towards noon on June 13 rain commenced to fall, and continued practically without ceasing until the morning of the 15th, —this being the first rainfall of appreciable magnitude since May 14th. The effect on the milk-secretion is obvious. Thus, of the afternoon milks of June 13, 11 are below the average and only 3 above, so that the first effect of the rain would in this instance appear to have been to create a tendency to the secretion of poorer milk. In the milks yielded on June 14 a tendency in the reverse direction is, however, perceptible, being indeed especially marked in the evening milks, and this tendency is also clearly noticeable in the morning milks of June 15. With the return of much more favourable weather conditions on the morning of June 15 a decided tendency towards secretion of poorer milk is noticeable in the evening results of that day, becoming less pronounced on the 16th and 17th.

On June 18 a period of cold weather was entered upon, which lasted until the 24th, the nights especially being very cold, frost being indeed recorded on the nights of the 20th, 21st, and 22nd. With the commencement of this cold period we note in the morning milks of June 18 a decided tendency to secretion of milk of less than average quality, followed, as the evening results show, by a tendency in the reverse direction under the more congenial conditions prevailing in the daytime. On the 19th and 20th these tendencies are less pronounced, but after the sharp frost during the night of the 20th a further set-back is noticeable in the morning milks of the 21st and 22nd, but cannot be observed in the morning milks of the 23rd. From the evening results for these three days little or no tendency to change can be deduced.

Rain fell heavily during the night of June 24-25, and it will be noted that the quality of the morning milks of June 25 was in the great majority of cases above the average,—a tendency to improvement after rain which is obvious also in the evening

results for the same and the following day, and also in the morning milks of June 27.

June 27 was the commencement of a dry and warm period, and it will be noted that in the evening milks a tendency to secretion of poorer milk is noticeable, this becoming less obvious on the 28th, whilst on the 29th the tendency is decidedly in the opposite direction, and this is especially marked in the morning milks of June 30. In the evening milks of that day, a bright hot day, there is, however, a decided reversal of the tendency, which once more is obviously towards the secretion of poorer milk, this being apparent also in the evening milks of July 1, and to a slight degree, perhaps, in those of July 2.

On July 3 we note again the tendency towards improvement of the morning milk after a night of heavy rain, the same tendency being observable in the evening results, and also, though not so pronounced, after the gale and heavy rain, in the morning milks of July 5.

It may be noted in passing that on July 3 and 5, when the wind was very strong, the evening results show a tendency towards secretion of richer milk—a tendency opposite to that mentioned above on June 11.

With the night of July 6-7 a fine period set in which lasted until July 11. It will be noted that the immediate effect is a tendency to secretion of poorer milk, which is most pronounced on July 7 in both morning and evening milks, and in the morning milk of July 8—a temporary move in the opposite direction being, however, recorded in the evening milks of that day. On July 9, however,—the hottest day of the year,—the original tendency to deterioration of quality is again quite pronounced, especially in the evening milks, the tendency becoming less with a continuance of the warm weather on the 10th.

On July 11 a change to more unfavourable climatic conditions occurred, and the effect is seen in the fact that no fewer than 14 cows yielded in the evening of that day milk of higher than average quality, whereas with a temporary return to more congenial conditions on the following day the tendency is once more reversed.

During the night of July 12-13, however, a decided fall of temperature occurred, accompanied on the 13th by rain, and it will be noted that there was, as compared with the 12th, a tendency to secretion of richer milk, which is also marked after rain on the afternoons of the 14th, 15th, 16th, and 17th, and in the morning milks of July 16. On the other hand, the tendency was, if anything, in the opposite direction on the mornings of July 15 and 18, both of which succeeded wet nights.

With the reversion to more pleasant climatic conditions on July 20 an increasing tendency to secretion of poorer milk in the morning is observable, accompanied by a tendency in the opposite direction in the evening milks, these tendencies not being apparent, however, on the following day. The night of the 21st-22nd was very wet, but the 22nd was on the whole fine. The effect would appear to have been a tendency to secretion of richer milk in the morning and poorer milk in the evening, the same tendency being noticeable in the evening milks of the 23rd—a fine, warm day.

On the evening of the 24th a remarkable tendency to secretion of richer milk is to be noted, no fewer than 16 of the 18 cows yielding milk of decidedly more than average quality. The explanation is probably to be found in the fact recorded in the notes on p. 325, that on this day the cows were turned into a new pasture, namely, one from which a crop of hay had just been removed. The improvement in the milk on this evening is also shown clearly in the analysis of the bulk sample.

July 25 was a fine hot day, and this had apparently the effect of inducing in the majority of cases secretion of poorer milk, as was evident in the evening milks of that day,—an effect similar to that previously observed on the hot days, July 7-10. Heavy rain followed during the night, and this had apparently the effect of causing richer milk to be yielded on the morning of the 26th,—the same tendency being noticeable in the evening milks of the same day, which, though in part fine, was decidedly more unfavourable than the 25th.

With the return of cold weather during the night of the 26th-27th, a tendency to secretion of poorer milks is recorded in both the morning and evening results of the 27th, whilst after heavy rain during the night the morning milks of the 28th show a slight improvement as compared with the 27th, the improvement being also apparent in the evening milks, though this in the latter case was perhaps due to the return of more favourable weather conditions.

The results for the remaining three days of the experiment show no features of particular interest.

It will be noted that even when the results are subjected to a detailed analysis such as the foregoing, the effect of climatic changes on the quality of the milk is not very obvious, the variations with a certain change in the climatic conditions—*e.g.*, from warm to cold—being on some occasions in the one direction, whilst on other occasions when the conditions were apparently precisely similar the change is in the opposite direction,—greater regularity being shown on the whole by the morning than the evening milk.

After a very careful scrutiny of the whole of the records, the

author is of opinion, however, that the following general conclusions can be drawn as to the effect of climatic changes on the quality of the milk secreted by the majority of the cows:—

- (a) Change from an equable to either a decidedly low or a decidedly high temperature tends at first to secretion of milk poorer in fat (*vide* June 18, 19, 21, 22, 30, July 1, 2, 7, 9, 18, 27).
- (b) The first effect of a fall of rain would appear to be a tendency to secretion of richer milk, this being especially noticeable in the morning milks, after wet nights (*vide* June 14, 25, 27, July 3, 5, 16, 22, and 26). This may perhaps be due to the increased succulence of the grass.
- (c) The influences are only of a very temporary nature, the return to normal conditions being fairly rapid with a continuance of fairly uniform climatic conditions.

In view of the many observed discrepancies, however, these conclusions are given with all reserve. It is obvious that the present experiment was of far too short duration for the satisfactory elucidation of the question, and until more extensive investigations have been carried out it would be unwise to express more than a general opinion as to the nature of the influences exerted.

Whether climatic changes exert any influence on the *quantity* of milk secreted it is almost impossible to say, the effects—if any—being in the present investigation apparently so slight as to be indistinguishable from what are usually regarded as the normal fluctuations, in determining which, the weather can be but one factor out of many.

The Mixed Milk of the Herd.

As previously stated (p. 271), the mixed milk of the herd was carefully sampled and analysed daily, night and morning, throughout the 52 days over which the experiment extended (June 10–July 31).

The daily results for the total yield (lb.), the fat (per cent), and solids-not-fat (per cent) are given in the table on p. 325.

It will be observed that the fat in the morning milk was above 3 per cent on only 13 of the 52 days, and indeed no fewer than 8 of these 13 fell within the last twelve days of July, when for some reason which is not very apparent a decided improvement in the quality of the morning milk was recorded.

The lowest value recorded in the morning was 2.55 per cent on June 19, and the highest 3.30 per cent on July 19.

The evening milk always contained well over 3 per cent and on many occasions more than 4 per cent of fat—the lowest

recorded being 3.60 per cent on June 15 and the highest 5.25 per cent on July 11.

The average of all the morning samples during the whole 52 days was 2.88 per cent of fat, and of the evening samples 4.18 per cent.

The solids-not-fat, as in previous experiments, were comparatively constant, the extreme values observed being 8.56 (July 6) and 9.40 (June 11) in the morning, and 9.07 (June 18) and 8.38 (June 28) in the evening milk.

It will thus be observed that for the third year in succession the average percentage of fat in the morning milk as delivered in the dairy at Garforth during the summer months has only on very few days reached the standard of 3 per cent embodied in the regulations for the sale of milk at present in force—a phenomenon which has, moreover, been recently observed with other herds in other parts of the country, and is thus not merely peculiar to the Garforth herd.

Summary of the Results.

The following general conclusions have been drawn from the experiments described in this paper:—

1. Change from a highly nitrogenous diet to one relatively poor in nitrogen causes secretion of a greater quantity of milk, but of milk rather poorer in fat (cp. Ingle, 'Trans.,' 1902, p. 297)—the change in the fat-content being much more pronounced in the morning than in the evening milk.

Presumably, therefore, the reverse change—i.e., from a diet poor in nitrogen to one relatively rich in nitrogenous constituents—would effect an improvement in the quality of the milk, though accompanied by a relative decrease in the yield, as indeed was found to be the case by Mr Ingle by direct experiment ('Trans.,' 1902, p. 296).

2. Concentrated food given only in the morning tends to increase the fat-content of the *morning* milk (cp. Ingle, 'Trans.,' 1903, p. 173), but there is apparently no analogous improvement in the evening milk.

The conclusions drawn by Mr Ingle from his 1901 and 1902 experiments are thus fully confirmed.

3. Concentrated food given only in the evening also tends to increase the fat-content of the morning milk, but has apparently little or no effect on the evening milk.

4. The above-mentioned changes are not of a pronouncedly temporary nature, since they persist without appreciable diminution for fully five weeks after the change of treatment.

5. The effects of sexual excitement are, as a rule, most pronounced on the milk-yield, which, in general, at first shows a

marked diminution, followed usually at the next milking by a yield well above the average. The fat-content is usually at first considerably diminished, but at the following milking is sometimes abnormally high, sometimes abnormally low.

The fat-content of the milk yielded on the two or three days immediately preceding the outward manifestation of sexual excitement is in nearly every case decidedly above the average. In most cases the disturbing effect is not appreciable after two, or at most three, succeeding milkings.

Results at variance with these conclusions were, however, obtained with a few cows.

6. Provided the milking be satisfactorily performed, the individuality of the milker has no appreciable influence on the milk-yield or the quality of the milk.

7. *Influence of climate.*

(a) The influence apparently varies considerably with different cows.

(b) Change from an equable to either a decidedly low or a decidedly high temperature tends in the majority of cases to induce secretion of milk poorer in fat.

(c) When cows are at pasture the first effect of a fall of rain is probably—with most cows—to cause secretion of richer milk (especially in the case of morning milk yielded after a rainy night), this being perhaps attributable mainly to the increased succulence of the grass.

(d) The influences are only of a very temporary nature, the return to normal conditions being fairly rapid with a continuance of fairly uniform climatic conditions.

8. The average percentage of fat in the morning milk yielded by the Garforth herd during the summer months is on most days below 3 per cent (cp. Ingle, 'Trans,' 1902, p. 298; 1903, p. 180).

The Garforth herd is not peculiar in this respect, as similar results have been obtained with other herds in different parts of the country.

In conclusion, the author desires to take this opportunity of expressing his thanks to Mr E. Percy-Kaye, BSc., for valued assistance in the preparation of the diagrams, and to Professor R. S. Seton, B.Sc., for kindly criticism and advice in connection with the experiments.

COW No. 2. (GROUP II.) Age, 3 years. Calved, Nov. 1, 1902.
Weight on July 1, 10 cwt. 2 qr. 16 lb.; on July 31, 10 cwt. 2 qr. 6 lb.

DATE.	Milked by	MORNING.				Milked by	EVENING.				REMARKS.
		Interval milking	Milk-yield.	Fat.	Solids not-fat.		Interval milking	Milk-yield.	Fat.	Solids not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	J. H.	14 27	14	3.00	8.44	J. H.	9 15	8 1/2	4.16	9.32	In "season." Served
Thur. 11	"	14 30	14	3.00	8.82	W. W.	9 35	12 1/2	4.10	9.01	at 2 P.M.
Friday 12	"	14 30	13 1/2	3.00	9.26	"	9 10	12 1/2	3.80	8.90	
Sat. 13	"	15.00	14	2.65	9.07	J. L.	8.40	13	4.15	9.05	
Sun. 14	"	15.15	13 1/2	2.60	8.91	W. W.	8.45	12	4.30	8.90	
Mon. 15	"	15.15	15	2.70	9.52	H. T.	9.10	11	2.05	9.25	
Tues. 16	"	14.55	14 1/2	3.05	9.07	J. H.	9.25	10	4.50	9.00	
Wed. 17	"	14.35	15	3.10	9.10	W. W.	9.05	8 1/2	3.00	9.28	
Thur. 18	W. W.	14.45	17	2.78	8.06	"	9.05	11	4.20	9.04	
Friday 19	"	15.00	14	3.00	8.36	J. H.	9.05	11	4.20	9.04	
Sat. 20	A. K.	14.40	12	1.95	8.98	N. D.	9 25	8 1/2	2.20	9.06	
Sun. 21	W. W.	14.55	19*	3.30*	9.12*	W. W.	8.40	10	7.10*	8.40*	In "season"?
Mon. 22	"	15.15	13	2.80	9.08	J. L.	8.45	11 1/2	4.10	8.68	
Tues. 23	J. H.	15.15	13	2.50	8.82	J. H.	9.30	12	3.65	8.92	
Wed. 24	"	14.40	14	3.00	8.80	W. W.	9.05	10	3.70	8.70	
Thur. 25	"	14.40	14	3.20	8.87	"	8.25	11	4.70	8.64	
Friday 26	W. W.	15.35	15	3.00	8.90	J. H.	9.10	10 1/2	4.50	8.78	
Mean daily results of 1st period		14.45	14.4	2.95	9.06	..	9.05	10.8	4.07	9.00	
Sat. 27	R. J.	14.55	13 1/2	2.40	8.77	J. H.	9.20	10	3.07	8.56	
Sun. 28	J. H.	14.40	14	3.15	8.20	"	8.25	8	4.50	8.64	
Mon. 29	R. B.	15.40	15 1/2	3.30	8.58	"	9.10	9 1/2	4.58	8.72	
Tues. 30	"	14.45	15	3.20	8.68	"	9.10	10	4.00	8.86	
July											
Wed. 1	J. H.	14.35	15	3.17	8.92	R. B.	9.20	10 1/2	3.80	8.60	
Thur. 2	W. B.	14.55	10 1/2	2.35	8.81	"	9.10	11	5.30	8.40	
Friday 3	J. H.	14.50	13	3.20	8.68	J. L.	8.20	11	4.78	8.59	
Sat. 4	R. J.	15.25	12 1/2	2.62	9.14	S. F.	9.15	11	3.50	8.79	
Sun. 5	"	14.20	10	2.20	9.35	L. L. W.	9.05	12	4.40	8.81	
Mon. 6	R. B.	14.30	13 1/2	3.40	8.97	J. L.	9.55	12	5.48	8.83	
Tues. 7	W. W.	14.45	13 1/2	2.92	8.75	S. F.	9 25	9	3.00	8.53	
Wed. 8	L. L. W.	15.00	14	2.30	8.85	J. L.	8.45	12 1/2	5.50	8.88	
Thur. 9	W. W.	15.10	12	2.08	8.86	W. W.	9.15	12	4.17	8.66	
Friday 10	J. H.	13.45	12	2.50	8.68	J. H.	10.35	12	4.70	8.55	
Sat. 11	L. L. W.	13.80	12 1/2	3.10	8.81	J. L.	9.45	10 1/2	5.60	8.96	
Sun. 12	W. B.	15.15	14	2.70	9.06	J. H.	8.20	10	4.60	8.68	
Mon. 13	L. L. W.	15.25	13	2.20	8.78	N. D.	9.05	10	3.87	8.83	
Tues. 14	"	15.05	13 1/2	2.70	8.92	W. B.	9.20	10 1/2	5.50	8.68	
Wed. 15	W. W.	14.40	14	3.70	8.72	J. H.	9.00	9	5.04	8.60	
Thur. 16	L. L. W.	13.50	13	3.08	8.72	W. W.	10.25	11	4.38	8.67	
Friday 17	"	14.00	13	3.20	8.72	"	9.35	9 1/2	4.10	8.67	
Mean daily results of period, June 27-July 17		14.45	13.2	2.83	8.80	..	9.10	10.5	4.58	8.67	
Sat. 18	W. W.	14.10	13	3.04	8.87	L. L. W.	9.15	10	5.20	9.00	
Sun. 19	"	15.45	13	3.40	9.08	"	7.45	7 1/2	1.30	8.77	
Mon. 20	L. L. W.	15.20	12	2.10	8.40	W. W.	10.15	10 1/2	4.55	8.57	Note short interval between A.M. and P.M. milkings.
Tues. 21	"	13.40	12	3.53	8.53	J. H.	10.20	9	4.20	8.68	
Wed. 22	W. W.	14.50	12	3.40	8.95	L. L. W.	8.15	8	5.33	8.83	
Thur. 23	L. L. W.	14.45	12 1/2	3.20	8.98	W. B.	9.55	9	4.20	9.02	
Friday 24	"	14.10	14	3.30	9.07	R. B.	10.15	10 1/2	5.00	8.96	Note short interval between A.M. and P.M. milkings.
Sat. 25	"	13.40	12	2.57	9.18	W. W.	10.10	12	4.90	9.06	
Sun. 26	W. W.	14.45	12	3.33	9.36	J. H.	8.40	8	4.48	8.98	
Mon. 27	"	15.25	16*	3.00	8.91	L. L. W.	8.20	9 1/2	5.10	9.18	
Tues. 28	L. L. W.	14.50	13	2.62	9.04	"	9.50	12	4.90	9.02	
Wed. 29	"	14.05	11 1/2	2.60	9.08	"	9.55	12	4.40	8.81	
Thur. 30	"	14.30	12	2.72	9.05	"	9.00	11 1/2	5.00	8.86	
Friday 31	"	14.30	13	3.20	8.83	J. H.	10.10	10	4.98	9.78	
Mean daily results of period, July 18-31		14.35	12.7	3.02	9.00	..	9.25	10	4.73	8.81	
Mean daily results of whole of 2nd period, June 27-July 31		14.40	13	2.90	8.88	..	9.20	10.3	4.64	8.71	
Mean daily results of whole experiment (32 days)		..	13.5	2.92	8.94	..	..	10.5	4.45	8.8	

COW No. 4 (GROUP III.) Age, 7 years. Calved (prematurely, 35 weeks i calf), April 6, 1903. Weight on July 1, 9 cwt. 2 qr. 6 lb.; on July 3 9 cwt. 1 qr. 16 lb.

DATE	Milked by	MORNING.				Milked by.	EVENING.				REMARKS.	
		Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.		Interval since last milking.	Milk-yield	Fat.	Solids-not-fat.		
June.		H. M.	lb.	%	%		H. M.	lb.	%	%		
Wed. 10	W. W.		23	2.90	9.22	W. W.	9.15	16½	3.60	9.26		
Thur. 11	"		14.25	20	2.80	8.78	"	9.25	17	3.60	8.85	
Friday 12	"		14.25	20	3.50	9.22	"	9.30	17	3.75	8.67	
Sat. 13	"		14.30	20	3.50	9.02	"	9.45	16	4.45	9.19	
Sun. 14	"		14.25	20	3.50	9.02	"	8.45	16	4.85	9.00	
Mon. 15	"		15.15	21	3.35	9.30	"	10.20	17	4.15	8.95	
Tues. 16	"		13.40	18	3.10	9.05	"	9.20	16½	4.30	9.09	
Wed. 17	"		14.55	21½	2.60	9.25	"	9.05	14	4.00	9.30	
Thur. 18	"		14.40	20½	3.20	9.05	"	9.20	16	"	"	
Friday 19	"		14.40	20½	3.00	9.13	"	9.20	16	4.05	9.06	
Sat. 20	"		14.40	20	2.80	9.09	"	9.20	17	4.55	9.55	
Sun. 21	J. H.		14.40	20	3.50	9.12	"	9.00	16½	3.70	8.80	
Mon. 22	W. W.		15.05	20	2.50	9.23	"	9.20	15	4.65	9.00	
Tues. 23	"		14.35	22	3.49	9.22	"	9.25	17	3.90	8.80	
Wed. 24	"		14.30	20	2.80	8.97	"	9.45	17½	4.10	9.14	
Thur. 25	"		14.10	20	3.00	9.08	"	9.35	17	3.80	8.71	
Friday 26	"		14.40	19	2.70	9.07	R. B.	9.30	16½	4.70	8.65	
Mean daily results of 1st period			14.35	20.3	3.07	9.10	..	9.25	16.4	4.10	9.02	
Sat. 27	J. H.		14.35	20	3.70	8.91	J. H.	9.30	16	3.87	8.60	
Sun. 28	R. B.		14.10	10	3.35	8.56	R. B.	10.00	14½	3.90	8.77	
Mon. 29	"		14.00	22	3.30	8.55	"	9.25	15	4.20	8.80	
Tues. 30	"		14.30	17½	2.70	8.58	"	9.30	11½	5.60	8.52	
July.												
Wed. 1	"		14.25	17½	3.32	8.58	"	9.40	13½	4.00	8.29	
Thur. 2	"		14.30	18½	3.20	8.68	"	9.40	14½	4.07	8.42	
Friday 3	"		14.30	21½	3.42	8.67	"	9.30	7½	1.86*	8.90*	In "season."
Sat. 4	"		14.40	23½	3.60	8.64	"	9.35	14½	4.00	8.55	
Sun. 5	"		14.25	20	3.50	8.99	"	9.45	14	3.78	8.54	
Mon. 6	"		15.20	20	3.10	8.93	"	9.25	14	4.58	8.80	
Tues. 7	W. W.		14.30	19	2.70	8.60	W. W.	9.30	16½	4.20	8.73	
Wed. 8	J. H.		14.50	20	3.40	9.09	"	9.25	14	3.60	8.73	
Thur. 9	W. W.		14.15	20	2.80	8.71	"	9.50	19½	3.10	9.06	
Friday 10	"		14.10	19	3.23	8.62	"	9.40	13½	4.50	8.71	
Sat. 11	"		14.20	18	4.00	8.85	R. B.	9.50	12½	5.05	8.95	
Sun. 12	J. H.		15.35	19½	3.90	8.90	W. W.	8.30	10	3.90	8.79	
Mon. 13	W. W.		15.00	19	3.70	8.68	"	9.20	12	3.92	8.90	
Tues. 14	"		14.50	20	3.77	8.67	"	9.20	18	4.18	8.76	
Wed. 15	"		14.35	19	2.80	8.65	"	9.20	18	4.40	8.62	
Thur. 16	"		14.50	18	3.56	8.75	A. K.	10.05	14	4.30	8.55	
Friday 17	"		13.45	17	3.58	8.73	N. D.	10.00	14½	4.10	8.82	
Mean daily results of 1st period, June 27-July 17			14.35	19.4	3.36	8.79	..	9.30	13.3	4.11	8.69	
Sat. 18	W. W.		14.00	18	3.76	8.90	W. W.	9.20	11	4.60	9.00	
Sun. 19	J. H.		15.00	15	4.00	8.81	"	8.45	10½	3.60	8.81	
Mon. 20	W. W.		15.10	17½	2.95	8.95	"	9.30	12½	4.00	8.74	
Tues. 21	"		14.15	17	3.45	8.85	R. G. W.	9.10	12	4.30	8.70	
Wed. 22	"		14.20	16	3.30	8.80	W. W.	9.10	12	4.80	8.75	
Thur. 23	"		14.40	16	3.06	8.70	R. G. W.	9.40	12½	5.47*	8.91*	
Friday 24	R. B.		14.50	19	2.56*	8.95	"	9.40	12½	5.20*	9.00*	In "season"
Sat. 25	W. W.		13.45	17	3.80	8.90	W. W.	9.15	10	5.00	9.28	
Sun. 26	"		14.10	17	3.75	8.92	"	8.50	12	1.35	8.99	
Mon. 27	"		15.05	17	3.08	8.93	"	9.25	13	4.90	9.07	
Tues. 28	"		14.55	15	3.20	8.70	"	9.10	12	4.40	8.74	
Wed. 29	"		14.30	18	3.60	8.68	"	9.15	9½	4.62	8.51	
Thur. 30	"		14.45	17	3.60	8.76	J. H.	9.20	9½	6.20	8.61	
Friday 31	J. H.		14.55	16½	3.90	8.59	W. W.	9.10	11½	3.75	8.90	
Mean daily results of 1st period, July 18-31			14.40	17.3	3.43	8.86	..	9.20	11.5	4.66	8.86	
Mean daily results of whole of 2nd period, June 27-July 31			14.35	18.6	3.39	8.82	..	9.25	12.6	4.33	8.75	
Mean daily results of whole experiment (59 days)			..	19.2	3.29	8.81	..	..	13.8	4.25	8.54	

COW No. 5. (GROUP IV.) Age, 5 years. Calved, March 22, 1903.

Weight on July 1, 11 cwt. 2 qr.; on July 31, 11 cwt. 3 qr. 8 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	Milked by	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	/	/		H. M.	lb.	/	/	
Wed. 10	R. B.	..	14	8.30	9.09	J. H.	8.30	8½	4.85	9.06	In "season."
Thur. 11	"	14.10	12	8.25	8.52	"	8.40	8	4.10	8.51	
Friday 12	"	14.35	12½	8.05	9.08	"	8.25	9	4.35	8.56	
Sat. 13	"	14.35	11½	8.05	9.08	"	8.45	7½	3.40	8.18	
Sun. 14	"	14.30	17½	8.25	9.01	"	8.35	7½	5.10	9.14	
Mon. 15	"	15.10	12½	8.85	8.00	"	8.25	8	4.00	8.78	
Tues. 16	W. W.	14.35	12½	8.15	9.07	"	8.25	8	4.15	8.18	
Wed. 17	R. B.	14.30	12	8.20	8.97	"	8.25	8	4.10	9.11	
Thur. 18	"	14.35	12½	8.20	9.04	"	8.30	9	4.15	9.07	
Friday 19	"	14.35	12½	8.15	9.25	"	8.30	8½	4.00	8.45	
Sat. 20	"	14.45	12	8.40	9.02	"	8.10	7	4.00	9.40	
Sun. 21	J. H.	14.35	11	8.00	9.08	"	8.00	8½	3.80	8.90	
Mon. 22	R. B.	15.05	11	8.80	8.02	"	8.25	8½	3.00	9.02	
Tues. 23	"	14.40	12	8.12	9.22	"	8.20	8	4.75	8.18	
Wed. 24	"	14.40	12½	8.52	8.63	"	8.35	7	4.10	8.80	
Thur. 25	"	14.15	12	8.15	8.63	"	8.25	8	4.20	8.77	
Friday 26	"	14.35	12	8.20	8.93	R. B.	8.10	7½	4.30	8.80	
Mean daily results of 1st period		14.35	12.4	8.17	9.00	..	8.20	8	4.16	8.94	
Sat. 27	R. B.	14.50	10	8.40	8.75	R. B.	8.15	8	5.10	8.98	
Sun. 28	"	14.35	10½	8.57	8.73	J. H.	8.55	7	8.74	8.72	
Mon. 29	"	15.00	12½	8.10	8.66	R. B.	8.25	8½	4.20	8.06	
Tues. 30	"	14.30	12	8.50	8.77	"	8.30	8½	8.84	8.84	
July.											
Wed. 1	"	14.25	12	8.37	8.56	"	8.40	9	8.78	9.07	
Thur. 2	"	14.30	12	8.20	8.66	"	8.35	9	4.07	8.70	
Friday 3	"	14.25	12	8.32	8.70	"	8.30	9	3.80	8.60	
Sat. 4	"	14.45	12	8.10	8.91	"	8.25	8½	4.10	8.63	
Sun. 5	"	14.35	11½	8.20	8.98	"	8.45	8	4.20	8.62	
Mon. 6	"	15.35	11½	8.30	8.85	"	8.05	8	1.40	8.87	
Tues. 7	"	14.30	10½	8.07	8.83	J. H.	8.55	8	8.70	8.70	
Wed. 8	J. H.	14.30	11	8.43	9.13	"	8.35	8	4.20	8.68	
Thur. 9	"	14.15	10	8.40	8.71	"	8.35	6½	3.77	8.80	
Friday 10	"	14.20	10	8.22	8.56	"	8.35	7½	4.00	8.61	
Sat. 11	"	14.25	10	8.20	8.80	R. B.	8.35	8½	5.06	9.17	
Sun. 12	"	15.40	10½	8.30	8.97	J. H.	8.35	7½	4.00	8.61	
Mon. 13	"	15.15	10	8.40	8.82	"	8.10	8½	4.20	8.80	
Tues. 14	"	14.45	10	8.40	8.79	"	8.25	8	4.20	8.63	
Wed. 15	"	14.45	10	8.30	8.80	"	8.10	7½	4.40	8.60	
Thur. 16	"	14.45	10	8.12	8.69	"	8.10	7½	4.50	8.86	
Friday 17	"	14.50	9	8.10	8.04	"	8.10	8	4.50	8.68	
Mean daily results of period, June 27-July 17		14.45	10.7	8.29	8.81	..	8.15	8.2	4.18	8.78	
Sat. 18	J. H.	14.50	9	8.22	8.98	J. H.	8.20	7½	1.10	9.05	
Sun. 19	"	14.45	10	8.78	8.87	W. W.	8.55	7	1.77	8.81	
Mon. 20	"	1.55	9	8.18	8.96	J. H.	8.20	7	4.15	8.75	
Tues. 21	"	14.15	9	8.30	8.73	"	8.20	7	1.32	8.70	
Wed. 22	"	14.40	9	8.30	8.95	"	8.30	7½	4.20	8.63	
Thur. 23	"	14.35	10	8.50	8.99	"	8.15	7	4.30	8.78	
Friday 24	R. B.	14.25	11	8.62	8.73	R. B.	8.45	7	5.10	8.28	
Sat. 25	J. H.	14.10	9½	8.40	8.82	J. H.	8.10	7½	3.00	8.73	
Sun. 26	"	14.45	9½	8.00	9.08	"	8.45	8	4.70	8.68	
Mon. 27	"	15.05	9½	8.00	8.88	"	8.30	9	4.52	8.60	
Tues. 28	"	14.40	10	8.77	8.77	"	8.20	7	4.00	8.66	
Wed. 29	"	14.40	9	8.40	8.90	"	8.10	8	4.30	8.85	
Thur. 30	"	14.50	10½	8.52	8.92	"	8.00	8½	4.70	8.70	
Friday 31	"	14.40	9	8.40	8.79	"	8.30	8	4.10	8.18	
Mean daily results of period, July 18-31		14.40	9.6	8.38	8.80	..	8.20	7.6	4.44	8.75	
Mean daily results of whole of 2nd period, June 27-July 31		14.40	10.3	8.33	8.84	..	8.20	7.9	1.28	8.77	
Mean daily results of whole experiment (52 days)		..	11.0	8.28	8.89	..	..	7.9	4.24	8.88	

COW No. 6. (GROUP I.) Age, 5 years. Calved, Jan. 16, 1903.

Weight on July 1, 13 cwt. 10 lb.; on July 31, 13 cwt. 1 qr. 14 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	J. H.	...	7	3.70	8.68	J. H.	4.35	5	3.70	8.24	In "season." Served at 2 P.M.
Thur. 11	"	14.10	4*	2.40*	8.65*	"	4.35	5½	2.50*	8.49*	
Friday 12	"	14.30	7	3.30	8.33	"	9.35	6	5.05	8.41	
Sat. 13	"	14.30	7	3.40	8.35	"	9.45	5½	4.10	8.64	
Sun. 14	"	14.40	7	3.50	8.80	"	8.25	5	4.40	8.70	
Mon. 15	"	15.10	6	2.55	8.52	"	9.30	5½	3.05	8.55	
Tues. 16	"	14.30	7	3.00	8.65	"	9.25	4½	3.60	8.50	
Wed. 17	"	14.35	7	2.50	8.75	"	9.25	5½	3.70	8.08	
Thur. 18	"	14.40	6	2.65	8.67	"	9.25	5½	3.70	8.56	
Friday 19	"	14.30	6	2.50	8.38	"	9.35	5½	3.70	8.50	
Sat. 20	"	14.20	6	2.50	8.31	"	9.30	5	3.50	8.48	
Sun. 21	"	14.40	7	3.60	8.20	"	8.55	4½	4.15	8.36	
Mon. 22	"	15.10	6	3.15	8.40	"	9.25	4	3.57	8.23	In "season." Served at 5 P.M. on July 2 and kept in during night. Note high solids-not-fat morning.
Tues. 23	"	14.35	6	2.76	8.14	"	9.20	4	3.40	7.97	
Wed. 24	"	14.45	6	3.10	7.87	"	9.40	5½	4.30	7.92	
Thur. 25	"	14.30	5½	3.18	7.88	"	9.10	4½	3.90	8.11	
Friday 26	"	14.35	6	3.20	8.11	"	9.15	5	4.00	8.16	
Mean daily results of 1st period		14.35	6.3	3.00	8.40	..	9.25	5.1	3.84	8.35	
Sat. 27	J. H.	14.55	4½	2.74	8.16	J. H.	9.20	4	2.76*	7.87	
Sun. 28	"	14.35	6	3.57	7.88	"	9.30	4	4.24	7.89	
Mon. 29	"	14.15	5	3.17	7.75	"	9.25	4½	3.07	7.93	
Tues. 30	"	14.35	5	3.10	7.84	"	9.20	4	3.10	7.96	
July.											
Wed. 1	"	14.30	5½	3.40	7.80	"	9.35	4	4.00	7.81	
Thur. 2	"	14.35	5½	3.20	7.83	"	9.35	3*	3.67*	7.72*	
Friday 3	"	14.35	5½	3.40*	8.65*	"	9.35	8*	4.10*	7.83*	
Sat. 4	"	14.35	5	4.10	8.08	"	9.30	5	5.00	8.08	
Sun. 5	"	14.30	4½	4.35	8.35	"	8.55	4	4.20	8.05	
Mon. 6	"	15.10	6	3.50	8.04	"	9.25	4½	4.30	8.08	
Tues. 7	"	14.35	4½	2.76	8.09	"	9.50	3	2.50*	7.84	
Wed. 8	"	14.30	5½	2.60	8.41	"	9.30	4	3.60	7.96	
Thur. 9	"	14.15	4½	2.90	7.89	"	9.40	4½	3.87	7.99	
Friday 10	"	14.15	4½	3.42	7.97	"	9.35	3½	3.10	7.86	
Sat. 11	"	14.30	4½	3.40	8.00	"	8.40	3½	3.50	8.14	
Sun. 12	"	14.45	5	3.30	8.25	"	8.20	3½	3.60	7.80	
Mon. 13	"	15.15	5	3.57	7.98	"	9.20	3½	4.20	8.25	
Tues. 14	"	14.40	4½	3.48	7.88	"	9.25	4	3.50	7.89	
Wed. 15	"	14.45	4	3.00	7.66	"	9.05	3½	3.70	7.81	
Thur. 16	"	14.50	4	3.03	7.58	"	9.05	3½	4.00	7.91	
Friday 17	"	14.15	3½	3.10	7.66	"	9.05	3½	3.60	7.91	
Mean daily results of period, June 27-July 17		14.35	4.8	3.27	7.99	..	9.20	3.8	3.74	7.94	Note high solids-not-fat evening, and gradual falling-off to July 30.
Sat. 18	J. H.	14.55	3½	3.25	7.57	J. H.	9.15	3	3.70	7.78	
Sun. 19	"	14.50	3½	3.40	8.00	W. W.	8.50	3	4.00	7.51	
Mon. 20	"	14.55	3½	3.78	7.70	J. H.	9.25	3	4.28	7.67	
Tues. 21	"	14.40	3½	2.40	7.35	"	9.20	2½	4.16	7.57	
Wed. 22	"	14.45	3½	3.52	7.62	"	9.25	3	4.00	7.83	
Thur. 23	"	14.35	2½	3.60	7.08	"	9.15	2½	3.40	8.05	
Friday 24	W. W.	14.35	2½	2.80	7.55	R. B.	9.15	3½	4.18	8.10	
Sat. 25	J. H.	14.05	2½	3.18	7.27	J. H.	9.35	2½	5.00	9.01	
Sun. 26	"	14.45	3½	3.80	7.72	"	9.43	2½	3.77	8.61	
Mon. 27	"	15.05	3½	3.10	7.88	"	9.13	2½	3.50	8.66	
Tues. 28	"	14.55	3½	3.30	7.75	"	9.20	2½	4.02	7.62	
Wed. 29	"	14.40	3½	4.30	7.63	W. W.	9.10	2½	4.50	7.46	
Thur. 30	"	14.50	3½	3.28	7.82	J. H.	9.00	2½	3.04	7.27	
Friday 31	"	14.50	3½	3.36	7.64	"	9.25	2	1.31	7.78	
Mean daily results of period, July 18-July 31		14.45	3.3	3.36	7.66	..	9.15	2.7	4.03	7.90	(Note solids-not-fat higher P.M. than A.M.)
Mean daily results of whole of 2nd period, June 27-July 31		14.40	4.2	3.31	7.86	..	9.20	3.4	3.85	7.96	
Mean daily results of whole experiment (52 days)		..	4.9	3.21	8.01	1.0	3.65	8.09	(Note low solids-not-fat.)

COW No. 7. (GROUP II.) Age, 5 years. Calved, May 17, 1903.

Weight on July 1, 12 cwt. 1 qr. 14 lb.; on July 31, 12 cwt. 2 qr. 10 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by	Interval milking	Milk-yield.	Fat.	Solids-not-fat.	Milked by	Interval milking	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	W. W.	..	20	2.15	9.14	J. L.	9.05	25	5.05	8.66	
Thur. 11	"	14.30	21½	2.60	9.16	W. W.	9.25	22	4.10	8.87	
Friday 12	"	14.40	24	2.65	9.15	"	10.05	23	3.70	9.09	
Sat. 13	"	14.05	22	2.15	9.13	J. L.	9.00	24	4.30	9.13	
Sun. 14	"	14.55	23	2.20	9.86	W. W.	8.45	19	4.55	8.16	
Mon. 15	"	15.30	25	2.50	9.40	"	9.00	20	4.60	9.20	
Tues. 16	"	14.40	21	1.75	9.45	"	9.20	21	4.25	9.50	
Wed. 17	"	15.10	24	2.00	9.87	"	8.40	19	3.70	9.39	
Thur. 18	"	15.05	23½	1.45*	8.85*	J. L.	8.45	22½*	6.80*	9.20*	
Friday 19	"	15.00	20	2.00	9.42	W. W.	9.20	17½	2.85	9.25	
Sat. 20	"	15.05	22	1.70	9.17	L. T.	9.10	17½	3.25	9.25	
Sun. 21	"	14.25	22	2.30	9.23	W. W.	8.50	18½	4.53	8.90	
Mon. 22	"	15.50	21	1.80	9.27	J. L.	8.30	22½	5.22	8.82	
Tues. 23	R. B.	15.10	22½	3.67	8.93	W. W.	9.20	15	3.18	8.92	
Wed. 24	W. W.	14.40	22	1.87	9.01	L. T.	9.45	18	3.45	8.92	June 24. In "season."
Thur. 25	"	14.10	24	8.07	8.00	W. W.	9.25	18	5.40	8.75	Note yields and fat per cent.
Friday 26	"	14.45	7*	1.55*	8.92*	J. H.	8.50	24*	5.10*	8.85*	
Mean daily results of 1st period		14.50	21.8	2.26	9.17	..	9.10	20.4	4.39	8.99	Note fluctuation in yield (especially P.M.) during this period. Also poverty in fat A.M.
Sat. 27	J. H.	15.20	15*	3.40*	8.61*	R. B.	9.10	20	3.38	8.54	
Sun. 28	"	14.20	21½	3.83	8.05	J. H.	8.53	18½	4.30	8.65	
Mon. 29	"	15.15	22	2.73	8.60	"	9.25	18	4.70	8.73	
Tues. 30	"	14.35	22	2.57	8.02	"	9.15	18	3.80	8.80	
July.											
Wed. 1	"	14.35	20½	1.98	9.11	W. T.	9.55	16	2.40	8.90	
Thur. 2	"	14.15	23	2.54	9.17	J. L.	9.15	22	6.00	8.44	
Friday 3	"	14.45	17½	1.98	9.01	L. W.	9.00	21	4.12	8.56	
Sat. 4	"	15.10	17½	1.60	9.04	W. T.	9.20	17½	2.70	8.88	
Sun. 5	"	14.45	22	2.80	9.00	J. H.	8.50	18	5.60	8.75	
Mon. 6	"	15.10	20	2.30	8.97	J. L.	9.15	19	5.20	8.88	
Tues. 7	W. W.	14.40	18	1.00	8.50	J. H.	9.15	16	3.20	8.86	
Wed. 8	"	15.25	20	1.60	8.61	J. L.	8.35	20	4.87	8.48	
Thur. 9	"	14.45	20	2.37	8.31	L. T.	9.50	15½	3.07	8.65	
Friday 10	"	14.05	20	2.40	8.59	W. W.	9.40	17½	4.50	8.64	
Sat. 11	"	14.20	19	2.70	8.85	J. L.	8.20	19	6.75*	8.64	
Sun. 12	"	16.30	21	1.70	9.13	W. W.	7.55	14	3.50	8.84	Note high fat P.M. In "season."
Mon. 13	"	15.20	10	1.08	8.78	W. T.	9.15	14½	2.72*	8.76	
Tues. 14	"	14.50	22	2.75	9.01	W. W.	9.10	17	5.10	8.26	
Wed. 15	"	14.40	18	1.82	8.76	"	9.15	19	5.20	8.52	
Thur. 16	"	14.50	18	2.40	8.77	B. W.	9.40	16	4.40	8.39	
Friday 17	"	14.10	17	2.12	8.96	S. F.	9.35	17	3.10	8.70	
Mean daily results of period, June 27-July 17		14.50	19.7	2.33	8.80	..	9.10	17.6	4.26	8.67	Great fluctuations in P.M. yield. Fat per cent A.M. below 2 per cent on 8 days.
Sat. 18	W. W.	14.25	17	2.13	8.43	W. W.	9.25	15½	3.90	8.49	
Mon. 19	J. H.	14.55	19	3.17	9.02	W. B.	8.65	14½	4.72	8.38	
Mon. 20	W. W.	15.00	18	2.10	8.95	W. W.	9.10	16	5.07	8.78	
Tues. 21	"	14.50	18	3.48	9.18	"	9.00	15	4.22	8.68	
Wed. 22	R. B.	14.50	16	1.90	8.79	"	9.20	15½	3.90	8.56	
Thur. 23	W. W.	14.40	17½	2.12	9.04	"	9.05	14	3.50	8.88	
Friday 24	"	15.05	19	2.97	9.03	"	9.40	15½	4.90	8.81	
Sat. 25	"	13.50	18	2.63	8.94	W. B.	9.50	16½	3.90	8.52	
Sun. 26	"	14.35	19	2.40	9.07	W. W.	9.45	15	4.47	8.68	
Mon. 27	"	15.10	20	2.20	8.96	"	9.25	17	4.30	8.47	
Tues. 28	"	14.55	19	2.18	9.00	"	9.05	16	4.40	8.80	
Wed. 29	"	14.40	19	2.28	9.04	J. H.	9.10	16	4.20	8.80	
Thur. 30	"	14.50	18	1.82	9.05	W. B.	8.55	16	3.53	8.97	
Friday 31	"	15.20	18	1.80	9.10	W. W.	9.10	17	4.10	8.56	
Mean daily results of period, July 18-31		14.50	18.2	2.37	9.01	..	9.15	15.7	4.20	8.73	
Mean daily results of whole of 2nd period, June 27-July 31		14.60	19.1	2.35	8.90	..	9.10	16.0	4.23	8.71	
Mean daily results of whole experiment (70 days)		..	20.0	2.32	8.90	..	..	18.0	4.23	8.80	

COW No. 8. (GROUP I.) Age, 5 years. Calved, April 27, 1903.

Weight on July 1, 12 cwt. 14 lb.; on July 31, 12 cwt. 1 qr. 18 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		A. M.	lb.	%	%	H. M.	lb.	%	%	%	
Wed. 10	R. B.	..	20	8.85	8.45	B. W.	0.30	1.50*	8.42	8.42	In "season" ?
Thur. 11	"	14.10	18	2.10	0.01	J. H.	0.35	1.81	3.00	8.40	
Friday 12	"	14.40	19	4.00	8.45	N. D.	0.40	1.8	4.35	8.84	
Sat. 13	"	14.20	14½	2.06*	8.88*	B. W.	0.20	8	3.40*	8.72*	
Sun. 14	"	14.55	14	2.00	8.02	J. H.	8.35	12	6.25	8.61	
Mon. 15	"	15.05	18½	3.40	8.10	H. T.	0.35	11½	3.03	9.00	
Tues. 16	"	14.35	18	2.50	8.00	J. H.	0.20	11	3.05	9.15	
Wed. 17	"	14.30	18	2.30	8.02	"	0.30	12½	3.30	8.88	
Thur. 18	"	14.25	18	2.43	8.11	L. W.	0.05	14½	4.30	9.12	
Friday 19	"	15.05	16	2.10	9.06	J. L.	0.20	14	3.30	8.10	
Sat. 20	"	14.25	15½	1.88	8.10	H. T.	0.45	10½	1.75*	8.97	
Sun. 21	J. H.	14.35	18	2.80	8.75	J. H.	8.55	11	3.05	8.18	
Mon. 22	R. B.	15.05	17	2.60	8.48	L. W.	0.05	13½	1.40	8.65	
Tues. 23	"	14.55	15½	3.47	8.05	J. H.	0.25	11	3.00	8.05	
Wed. 24	"	14.40	16	2.50	8.71	H. T.	0.10	10½	2.05	8.55	
Thur. 25	"	14.30	15½	2.10	8.58	J. H.	0.25	10½	3.70	8.52	
Friday 26	"	14.30	15½	2.00	8.81	R. B.	0.20	9½	4.30	8.18	
Mean daily results of 1st period		14.40	17.1	2.75	8.77	..	0.20	11.4	3.68	8.71	
Sat. 27	R. B.	14.55	14	2.60	8.55	J. H.	0.20	9½	3.45	8.25	
Sun. 28	"	14.30	15½	3.70	8.08	R. B.	8.30	10	5.50	8.06	
Mon. 29	"	15.25	13	2.40	8.12	"	0.20	9	2.00	8.00	
Tues. 30	"	14.35	14	2.07	8.58	"	0.20	11½	4.23	8.61	
July.											
Wed. 1	"	14.35	15	4.2	8.25	S. F.	0.45	10½	4.22	8.50	
Thur. 2	"	14.30	13	3.33	8.18	L. W.	0.05	10	5.80	8.50	
Friday 3	"	14.55	13½	2.00	8.32	J. L.	8.55	11	4.50	8.29	
Sat. 4	A. K.	15.15	14	1.04	8.78	W. T.	0.30	11	2.48	8.78	
Sun. 5	L. I. W.	14.40	14	1.70	9.03	J. H.	8.55	11	3.90	8.50	
Mon. 6	"	15.20	14	1.67	8.02	H. T.	8.55	10½	3.00	8.73	
Tues. 7	"	15.00	14	1.68	8.18	S. F.	0.05	9	8.67	8.82	
Wed. 8	"	14.00	18½	2.30	8.45	L. W.	0.40	18½	0.10*	8.40*	
Thur. 9	"	15.15	12½	1.25*	8.17	W. W.	0.10	10½	3.30	8.40	
Friday 10	"	14.35	18½	2.00	8.06	J. H.	0.30	10	4.00	8.21	
Sat. 11	W. W.	14.35	12	2.80	8.50	L. W.	8.05	10	6.15	8.23	
Sun. 12	W. B.	10.00	12	2.18	8.65	L. L. W.	8.05	10	4.10	8.48	
Mon. 13	L. L. W.	15.50	11½	1.60	8.08	N. D.	8.55	9½	4.00	8.01	
Tues. 14	"	10.05	12	1.50	8.62	W. W.	0.10	9	3.47	8.48	
Wed. 15	W. W.	14.40	11	1.83	8.55	"	0.15	8	4.83	8.15	
Thur. 16	L. L. W.	15.00	12	3.30	8.30	"	8.50	9	5.12	8.30	
Friday 17	"	15.10	12	2.80	8.65	"	8.15	8½	5.10	8.84	
Mean daily results of period, June 27-July 17		14.55	13.1	2.38	8.52	..	9.05	10	4.41	8.42	
Sat. 18	W. W.	14.55	8*	1.02*	8.14*	L. L. W.	0.15	9½	2.88	8.61	In "season" ?
Sun. 19	W. B.	14.05	11½	3.85	8.82	W. D.	8.35	8½	5.88	8.19	
Mon. 20	"	15.30	13	2.88	8.32	W. W.	0.10	9½	5.70	8.28	
Tues. 21	"	14.25	10½	2.73	8.21	"	0.35	7	2.60	8.78	
Wed. 22	W. W.	11.35	11	3.08	8.53	"	0.30	8	4.80	8.02	
Thur. 23	"	14.30	10½	3.38	8.48	W. B.	0.10	8	4.60	8.45	
Friday 24	R. B.	15.00	10	2.20	8.50	"	0.30	7	4.10	8.74	
Sat. 25	W. W.	14.05	10½	2.40	8.33	J. H.	0.40	8	3.00	8.77	
Sun. 26	"	14.35	11½	2.70	8.87	W. W.	8.50	8½	4.27	8.68	
Mon. 27	J. H.	15.05	11	2.33	8.50	J. H.	0.35	8	2.00	8.40	
Tues. 28	W. B.	11.15	12½	2.18	8.17	"	0.40	9	3.70	8.62	
Wed. 29	J. H.	14.45	11	2.60	8.43	W. W.	0.05	9	3.64	8.72	
Thur. 30	W. B.	14.40	11½	2.40	8.66	W. B.	0.20	8	2.01	8.45	
Friday 31	"	11.45	11	2.00	8.40	J. H.	0.20	8	4.84	8.35	
Mean daily results of period, July 18-31		14.40	11	2.75	8.50	..	0.20	8.3	4.05	8.57	
Mean daily results of whole of 2nd period, June 27-July 31		14.50	12.3	2.53	8.51	..	0.10	9.4	4.27	8.48	
Mean daily results of whole experiment (52 days)		..	12.9	2.60	8.61	..	..	10.1	4.07	8.56	

{ Fat per cent A.M. below
2 per cent on 8 days, P.M.
above 53 per cent on 6
days.

COW No. 9. (GROUP IV.) Age, 4 years. Calved, Feb. 25, 1903.

Weight on July 1, 13 cwt. 8 lb.; on July 31, 12 cwt. 3 qr.

DATE.	Milked by.	MORNING.				EVENING.				REMARKS.
		Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%	H. M.	lb.	%	%	
Wed. 10	J. H.	17	2.70	8.86	8.86	L. W.	15	3.25	8.38	
Thur. 11	"	14.25	10 $\frac{1}{2}$	3.00	9.00	J. H.	12	3.70	8.50	
Friday 12	"	14.30	17	2.90	8.85	N. D.	9 $\frac{1}{2}$	2.00	8.61	
Sat. 13	"	14.20	17	2.10	8.60	L. W.	15 $\frac{1}{2}$	4.00	8.68	
Sun. 14	"	14.50	14 $\frac{1}{2}$	2.25	8.82	J. H.	12	3.45	9.15	
Mon. 15	"	14.45	17	2.80	8.78	"	12	3.75	8.55	
Tues. 16	"	14.30	16.	2.55	8.75	"	12	3.80	8.65	
Wed. 17	"	14.25	17	2.87	8.58	"	12	4.20	8.70	
Thur. 18	"	14.30	16	2.25	8.55	"	12	4.10	8.68	
Friday 19	"	14.30	16	2.75	8.66	L. W.	14 $\frac{1}{2}$	4.00	8.50	
Sat. 20	"	14.40	15	2.00	8.59	J. H.	15	3.90	8.69	
Sun. 21	"	14.55	17 $\frac{1}{2}$	2.58	8.62	"	12 $\frac{1}{2}$	4.20	8.63	In "season." Served at 8 A.M.
Mon. 22	"	15.30	18	2.77	8.61	"	13	3.65	8.56	
Tues. 23	"	14.80	17	2.90	8.71	"	12 $\frac{1}{2}$	3.90	8.61	
Wed. 24	"	14.15	16 $\frac{1}{2}$	2.80	8.82	"	13 $\frac{1}{2}$	3.90	8.61	
Thur. 25	"	14.05	16	2.78	8.62	"	12 $\frac{1}{2}$	3.40	8.51	
Friday 26	"	14.30	16	2.30	8.55	"	12	3.60	8.58	
Mean daily results of 1st period		14.35	16.3	2.68	8.70	..	12.7	3.77	8.68	
Sat. 27	R. B.	15.10	17	2.62	8.50	R. B.	11 $\frac{1}{2}$	3.50	8.48	
Sun. 28	J. H.	14.25	16	2.90	8.47	"	8.35	11	3.87	8.34
Mon. 29	R. B.	15.25	15 $\frac{1}{2}$	2.05	8.45	"	12	3.80	8.70	
Tues. 30	"	13.40	16 $\frac{1}{2}$	2.88	8.69	"	10.20	9	2.90	8.47
July.										
Wed. 1	"	14.30	16	2.80	8.53	"	10	3.07	8.48	
Thur. 2	"	14.50	16 $\frac{1}{2}$	2.90	8.51	B. W.	12	4.28	8.22	
Friday 3	J. H.	14.35	14 $\frac{1}{2}$	3.03	8.27	"	11	4.00	8.36	
Sat. 4	B. W.	14.55	14	2.90	8.13	N. D.	10	3.90	8.10	
Sun. 5	R. B.	14.35	15	3.18	8.10	R. B.	8.15	10	4.00	8.30
Mon. 6	"	15.20	16	2.73	8.54	"	11	4.00	8.44	
Tues. 7	"	14.35	15	2.90	8.31	N. D.	8	2.45	8.21	
Wed. 8	J. H.	14.15	16	2.80	8.55	J. H.	10	3.93	8.30	
Thur. 9	"	14.15	15	2.86	8.28	"	10 $\frac{1}{2}$	3.78	8.28	
Friday 10	"	14.20	14 $\frac{1}{2}$	2.80	8.17	"	10	3.80	8.30	
Sat. 11	"	14.20	13	2.60	8.48	A. K.	8.10	7 $\frac{1}{2}$	3.70	8.78
Sun. 12	"	16.00	16 $\frac{1}{2}$	3.20	8.68	J. H.	8.30	9	4.68	8.40
Mon. 13	"	15.20	14	3.07	8.57	"	10	3.70	8.60	
Tues. 14	"	14.40	14	2.80	8.57	"	10 $\frac{1}{2}$	3.85	8.26	
Wed. 15	"	14.55	14	..	..	"	10	3.90	8.32	
Thur. 16	"	14.55	14	2.78	8.44	"	10	3.90	8.49	
Friday 17	"	14.45	14	2.60	8.41	W. W.	10 $\frac{1}{2}$	3.70	8.55	
Mean daily results of period, June 27-July 17		14.45	15.1	2.75	8.46	..	10.2	3.78	8.41	
Sat. 18	J. H.	14.15	13 $\frac{1}{2}$	2.93	8.29	J. H.	10 $\frac{1}{2}$	4.20	8.73	
Sun. 19	W. B.	14.10	13	2.70	9.01	W. W.	10	3.92	8.62	
Mon. 20	J. H.	15.00	13	2.78	8.57	J. H.	10	4.10	8.21	
Tues. 21	W. W.	14.30	13	3.05	8.72	"	9	4.18	8.72	
Wed. 22	J. H.	14.50	13 $\frac{1}{2}$	2.92	8.32	"	11.15	9	4.10	8.63
Thur. 23	"	14.45	12 $\frac{1}{2}$	2.92	8.35	W. B.	10	3.90	8.55	
Friday 24	W. W.	14.55	13	2.90	8.63	R. B.	10	4.38	8.40	
Sat. 25	J. H.	14.50	11 $\frac{1}{2}$	2.10	8.51	W. W.	9	3.70	8.70	
Sun. 26	"	11.45	12	4.27	8.77	J. H.	8.45	8 $\frac{1}{2}$	5.48	8.50
Mon. 27	W. W.	15.10	12 $\frac{1}{2}$	2.88	8.59	W. W.	10 $\frac{1}{2}$	4.40	8.44	
Tues. 28	W. B.	14.45	13	3.08	8.58	"	9	3.93	8.52	
Wed. 29	W. W.	14.10	14	3.10	8.40	J. H.	9	4.18	8.46	
Thur. 30	"	14.55	14 $\frac{1}{2}$	2.80	8.60	W. B.	10	3.50	8.51	
Friday 31	W. B.	14.55	14	2.50	8.61	J. H.	9.03	10	4.83	8.55
Mean daily results of period, July 18-31		14.50	13	2.95	8.58	..	9.15	9.6	4.22	8.55
Mean daily results of whole of 2nd period, June 27-July 31		14.45	14.3	2.88	8.51	..	10	3.96	8.47	
Mean daily results of whole experiment (52 days)		..	15.0	2.77	8.57	..	10.9	3.90	8.52	

COW No. 10. (GROUP I.) Age, 5 years. Calved, June 10, 1902. (Geld.)

Weight on July 1, 13 cwt. 1 qr. 10 lb.; on July 31, 13 cwt. 3 qr. 4 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.											
Wed. 10	W. W.	H. M.	lb.	%	9.27	A. K.	H. M.	lb.	%	8.81	
Thur. 11	"	13.50	6	3.40	9.16	W. W.	10.05	7	3.75	9.09	
Friday 12	"	14.05	7	2.65	9.26	S. F.	10.10	6½	3.60	9.09	
Sat. 13	"	13.50	7	3.50	9.07	B. W.	10.00	6½	3.30	9.22	
Sun. 14	"	14.05	6	3.35	9.23	W. B.	9.05	6½	4.15	9.00	
Mon. 15	W. B.	14.50	8½	3.75	9.00	S. F.	9.55	5½	3.05	8.43	
Tues. 16	W. W.	13.55	7	3.45	9.43	W. W.	10.05	5	3.70	9.16	
Wed. 17	"	14.35	6½	3.45	8.97	W. B.	9.00	6½	4.20	9.12	
Thur. 18	R. B.	14.30	6½	2.97	9.23	B. W.	9.40	6	3.90	8.90	
Friday 19	W. W.	14.10	6	3.26	9.24	W. B.	9.30	5	3.90	8.90	
Sat. 20	R. J.	14.35	7½	3.70	9.04	"	9.25	6	3.05	8.95	
Sun. 21	W. B.	14.30	6½	3.45	9.03	"	9.15	5	3.70	8.80	
Mon. 22	W. W.	15.25	7	2.98	9.21	B. W.	9.15	6	4.10	8.88	
Tues. 23	"	14.05	5	3.12	8.80	W. W.	10.05	5½	3.20	9.00	
Wed. 24	"	14.40	6½	2.93	8.93	S. F.	9.10	6	4.20	8.68	
Thur. 25	A. K.	14.45	7	3.65	8.85	W. B.	9.05	5	3.70	8.72	
Friday 26	W. W.	14.20	5	3.10	8.79	"	9.25	5	4.40	8.69	
Mean daily results of 1st period		14.25	6.7	3.80	9.09	..	9.35	5.9	3.78	8.92	
Sat. 27	R. J.	14.35	6½	3.80	8.82	W. B.	9.30	6	3.57	8.61	
Sun. 28	W. B.	14.50	6½	2.25*	8.87	"	8.35	6	4.70	8.58	
Mon. 29	"	15.00	7½	3.96	8.67	"	9.45	5½	4.00	8.81	
Tues. 30	"	14.35	8½	3.60	8.80	"	9.15	5½	3.80	8.90	
July.											
Wed. 1	"	14.40	7½	3.70	9.10	J. H.	9.40	5	3.60	9.08	
Thur. 2	"	14.15	7	3.60	9.13	B. W.	9.40	6	3.77	8.97	
Friday 3	W. W.	14.30	6	3.50	8.89	"	9.25	6	3.90	8.84	
Sat. 4	R. J.	14.25	6½	4.30	8.80	W. B.	9.35	5	3.60	8.76	
Sun. 5	L. L. W.	14.35	6½	3.80	9.10	R. J.	9.05	5½	3.70	8.70	
Mon. 6	R. J.	15.00	8½	4.15	8.67	L. W.	9.50	5	3.40	8.94	
Tues. 7	"	14.05	6	3.90	8.62	N. D.	9.40	5	3.90	8.72	
Wed. 8	"	14.15	6	4.60	8.78	L. W.	10.00	5	3.80	8.95	
Thur. 9	"	14.05	6	3.84	8.68	W. B.	10.05	5½	3.37	8.81	
Friday 10	"	13.55	6	3.95	8.61	"	9.40	5	3.50	8.78	
Sat. 11	"	14.25	6	3.28	8.82	B. W.	8.50	4½	4.00	9.20	
Sun. 12	B. W.	15.10	7	4.08	8.66	W. B.	8.55	4	4.20	8.46	
Mon. 13	R. J.	15.00	6½	4.00	8.68	"	9.20	5	3.70	8.68	
Tues. 14	"	14.45	6½	3.67	8.75	"	9.25	5	3.95	8.75	
Wed. 15	W. B.	14.35	6½	3.70	8.78	"	9.20	4½	4.18	8.91	
Thur. 16	R. J.	14.30	6	3.68	8.61	W. W.	10.00	5	3.30	8.90	
Friday 17	W. B.	14.10	6½	3.90	8.72	"	9.45	4½	3.20	8.83	
Mean daily results of period, June 27-July 17		14.30	6.5	3.74	8.80	..	9.30	5.2	3.72	8.83	
Sat. 18	W. B.	14.15	6	4.00	8.74	W. W.	9.55	4½	3.28	8.72	
Sun. 19	"	14.10	7	4.23	9.00	W. B.	8.45	4	3.50	8.96	
Mon. 20	W. W.	15.10	6½	3.78	8.92	R. G. W.	9.30	5	4.08	8.63	
Tues. 21	W. B.	14.30	7	3.62	9.04	W. W.	10.05	5	3.70	8.85	
Wed. 22	R. B.	14.35	7½	3.67	8.74	J. H.	8.35	4½	3.68	9.02	
Thur. 23	W. W.	14.30	7½	3.58	9.05	W. B.	8.40	4½	4.70	8.95	
Friday 24	W. B.	14.55	7½	3.97	9.03	"	9.30	4	3.68	9.18	
Sat. 25	W. W.	14.40	7	3.62	8.99	J. H.	9.35	5½	4.40	8.79	
Sun. 26	W. B.	14.05	6½	4.60	9.10	W. B.	8.55	5	4.22	9.03	
Mon. 27	"	15.05	7½	3.90	9.04	R. G. W.	9.20	4½	4.48	9.10	
Tues. 28	"	14.40	7½	4.30	8.75	J. H.	10.00	5	4.00	8.77	
Wed. 29	"	14.25	6½	3.28	8.52	W. W.	9.20	5	4.10	8.88	
Thur. 30	"	14.10	8	4.00	8.97	W. B.	9.35	5	3.50	8.70	
Friday 31	"	14.40	7	3.32	8.86	"	9.35	7½	4.30	8.77	
Mean daily results of period, July 18-31		14.35	7.1	3.95	8.94	..	9.25	4.8	3.97	8.89	
Mean daily results of whole of 2nd period, June 27-July 31		14.32	6.7	3.78	8.86	..	9.30	5.0	3.82	8.86	
Mean daily results of whole experiment (52 days)		..	6.7	3.62	8.94	..	..	5.1	3.81	8.88	

COW No. 11. (GROUP IV.) Age, 9 years. Calved, April 8, 1902. (Geld.)

Weight on July 1, 12 cwt. 3 qr. 18 lb.; on July 31, 13 cwt. 16 lb.

DATE.	Milked by.	MORNING.				Milked by.	EVENING.				REMARKS.
		Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.		Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	W. W.	14½	14½	2.20	9.10	W. W.	10.05	10	3.55	8.84	
Thur. 11	J. H.	14.30	14	2.60	9.10	"	9.30	11	3.55	8.78	
Friday 12	W. W.	14.35	13	2.85	8.57	"	9.00	10½	4.80	8.85	
Sat. 13	"	15.10	14	2.65	9.00	"	8.30	9	3.70	8.05	
Sun. 14	"	14.30	14	3.05	9.57	"	8.35	8	3.70	9.05	
Mon. 15	"	15.10	14½	2.90	9.39	"	9.25	9½	3.55	9.15	
Tues. 16	"	14.45	14	3.10	8.93	"	9.20	9	3.65	8.78	
Wed. 17	"	14.35	14½	3.00	9.26	"	9.10	10	3.80	9.35	
Thur. 18	"	14.40	13½	2.55	9.15	"	9.25	10	4.30	9.35	
Friday 19	"	14.45	15	2.90	9.81	B. W.	9.25	9½	4.28	9.15	
Sat. 20	R. J.	14.10	16	3.50	9.07	W. W.	9.35	9½	3.80	9.31	
Sun. 21	W. W.	14.50	13	2.85	9.38	"	8.45	9½	3.60	8.96	
Mon. 22	"	15.25	16	2.70	9.15	A. K.	9.15	9	3.83	9.10	
Tues. 23	"	14.30	14½	2.80	9.18	W. W.	9.25	10	3.60	9.00	
Wed. 24	"	14.50	15½	2.80	9.44	N. D.	9.30	10½	4.25	8.81	
Thur. 25	"	14.15	13	2.60	9.08	W. W.	9.25	11	3.90	8.60	
Friday 26	"	14.30	14	2.30	8.68	J. H.	9.25	10	3.70	8.78	
Mean daily results of 1st period		14.40	14.3	2.84	9.15	..	9.25	10.7	3.84	9.01	
Sat. 27	R. J.	14.25	17*	3.15	8.70	R. J.	9.45	11½	3.78	8.78	
Sun. 28	J. H.	14.40	14	2.96	8.80	J. H.	8.35	10½	3.40	8.02	
Mon. 29	"	15.15	15	2.85	8.91	"	9.20	9	3.70	8.91	
Tues. 30	"	13.40	14	2.70	8.08	"	10.20	9	3.48	8.56	
July.											
Wed. 1	"	14.35	13½	2.90	9.01	N. D.	9.35	10	4.30	8.80	
Thur. 2	"	14.35	12	3.10	9.08	J. H.	9.15	9	3.74	8.76	
Friday 3	W. W.	14.15	13	2.54	8.88	"	9.50	10	4.30	8.75	
Sat. 4	R. J.	14.10	13	3.80	8.88	N. D.	9.40	10	3.70	8.65	
Sun. 5	"	14.10	14	3.25	9.06	R. J.	9.15	10½	3.48	8.65	
Mon. 6	"	15.05	14½	2.87	9.08	B. W.	9.35	6½	3.80	8.92	In "season."
Tues. 7	"	14.15	13½	3.60*	9.03	N. D.	9.45	8½	4.50*	9.08*	
Wed. 8	"	14.15	14	3.08	9.10	J. L.	10.00	10	3.80	8.75	
Thur. 9	"	14.05	14½	3.07	8.68	N. D.	10.00	9½	3.00*	8.74*	Served at 9 A.M. Kept in all day.
Friday 10	"	14.05	13½	2.98	8.78	W. B.	9.55	10	3.70	8.86	
Sat. 11	"	14.00	13	3.18	9.18	B. W.	8.50	9½	4.40	9.27	
Sun. 12	W. W.	15.25	12	2.54	9.32	W. W.	8.55	10	3.60	8.98	
Mon. 13	R. J.	14.50	16*	3.50	8.82	R. J.	9.15	10	4.30	9.20	
Tues. 14	"	14.45	15	3.07	8.83	W. B.	9.50	10	3.00	8.84	
Wed. 15	"	14.05	14½	3.22	8.88	"	9.45	9½	4.02	8.74	
Thur. 16	"	14.20	13½	2.80	8.92	W. W.	9.10	10	3.77	8.95	
Friday 17	W. B.	14.35	14	3.23	9.13	"	9.30	8	3.58	8.96	
Mean daily results of period, June 27-July 17		14.30	14	3.05	8.95	..	9.30	9.5	3.88	8.84	
Sat. 18	W. B.	14.15	13	2.93	8.83	W. W.	9.35	7½	3.82	9.05	
Sun. 19	"	14.50	14½	3.00	9.06	W. B.	8.20	7	4.34	8.67	
Mon. 20	J. H.	15.40	12	3.62	9.17	"	9.05	8½	3.70	8.93	
Tues. 21	W. B.	14.20	12	3.07	8.83	J. H.	9.55	9	4.02	8.80	
Wed. 22	W. W.	14.30	11	2.97	9.27	W. W.	9.35	9	3.95	8.93	
Thur. 23	"	14.35	11	3.18	9.30	"	9.10	7½	3.30	8.76	
Friday 24	L. L. W.	15.30	12½	2.97	9.14	W. B.	8.55	8½	5.40	9.35	
Sat. 25	J. H.	14.10	11	3.22	9.11	W. W.	9.35	9	3.43	8.70	
Sun. 26	W. B.	14.45	13½	3.00	9.21	"	8.35	8	4.12	9.11	
Mon. 27	J. H.	15.15	11	2.48	9.38	R. G. W.	9.10	8	3.50	9.04	In "season."
Tues. 28	"	14.45	15½*	3.80*	9.02	W. W.	9.25	9	4.00	8.81	
Wed. 29	"	14.40	13	3.10	8.98	"	9.05	9	3.60	9.18	
Thur. 30	W. B.	14.55	15	2.72	9.23	J. H.	8.55	9½	4.40	9.05	
Friday 31	J. H.	14.50	14	3.10	9.28	W. W.	9.30	10	2.96	8.90	
Mean daily results of period, July 18-31		14.45	12.3	3.08	9.20	..	9.10	8.5	3.94	8.93	
Mean daily results of whole of 2nd period, June 27-July 31		14.35	13.5	3.06	9.05	..	9.25	9.1	3.87	8.87	
Mean daily results of whole experiment (52 days)		..	13.8	2.90	9.08	..	..	9.6	3.86	8.92	

COW No. 12. (GROUP III.) Age, 5 years. Calved, May 3, 1903.

Weight on July 1, 11 cwt. 1 qr.; on July 31, 11 cwt. 1 qr. 17 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	2		H. M.	lb.	%	2	
Wed. 10	R. B.	20 $\frac{1}{2}$	2.70	8.26	8.26	W. W.	0.10	16	5.00	8.66	
Thur. 11	"	14.35	1.04	2.80	8.08	"	0.45	15	3.00	8.58	
Friday 12	"	14.25	1.04	2.85	8.21	"	0.10	15	3.85	8.51	
Sat. 13	"	14.55	2.04	3.00	8.64	A. K.	0.00	12 $\frac{1}{2}$	4.10	8.64	
Sun. 14	"	15.15	2.04	2.45	9.15	W. W.	8.35	8	4.10	8.75	
Mon. 15	"	15.05	1.41	3.15	8.72	"	0.35	12	3.75	8.53	
Tues. 16	"	14.30	2.00	3.00	8.78	"	0.30	14	3.25	8.72	
Wed. 17	"	14.25	2.1	2.90	9.24	"	0.20	18	3.40	8.58	
Thur. 18	"	14.35	2.0	2.67	8.92	L. W.	0.05	11	4.00	8.71	
Friday 19	"	15.10	1.8	2.00	8.71	A. K.	0.15	16	3.50	8.57	
Sat. 20	R. J.	14.55	1.8	2.50	8.80	W. W.	0.00	15	3.50	8.57	
Sun. 21	W. W.	14.50	1.7	2.18	8.80	"	8.45	14	3.60	8.40	
Mon. 22	R. B.	15.15	1.8	2.65	8.85	A. K.	8.55	14	4.65	8.34	
Tues. 23	W. W.	15.00	1.7	2.80	8.50	W. W.	0.25	14	3.62	8.18	
Wed. 24	R. B.	14.45	1.8	2.85	8.21	H. T.	0.20	15	3.82	8.38	
Thur. 25	A. K.	14.35	1.7	2.58	8.48	W. W.	0.20	13	3.05	8.32	
Friday 26	R. B.	14.30	1.6	2.10	8.20	R. B.	8.15	14	4.25	8.21	
Mean daily results of 1st period		14.50	18.5	2.64	8.76	..	0.10	14	3.84	8.51	
Sat. 27	R. J.	14.45	1.7	2.45	8.48	R. J.	0.45	14	3.17	8.08	
Sun. 28	R. B.	14.15	1.5	2.26	8.24	R. B.	8.40	13	3.78	8.20	
Mon. 29	J. H.	15.25	1.8	3.15	8.09	J. H.	0.20	13	4.40	8.11	
Tues. 30	"	14.40	1.7	3.00	8.24	"	0.20	12	3.90	8.21	
July.											
Wed. 1	A. K.	14.25	1.6	2.80	8.45	H. T.	0.30	13	3.20	8.26	
Thur. 2	"	14.25	1.8	2.80	8.35	J. H.	0.40	12	4.11	8.30	
Friday 3	W. W.	14.15	1.7	2.60	7.99	A. K.	0.30	13	4.32	8.10	
Sat. 4	R. J.	14.40	1.6	2.60	8.28	H. T.	0.20	14	4.15	8.20	
Sun. 5	"	14.30	1.6	2.90	8.44	R. J.	0.10	13	4.20	8.32	
Mon. 6	"	15.10	1.9	2.57	8.28	J. H.	0.25	12	4.28	8.24	
Tues. 7	"	14.25	1.7	2.62	8.17	B. W.	0.10	13	4.90	8.47	
Wed. 8	"	14.45	1.8	2.28	8.40	H. T.	0.30	13	3.68	8.10	
Thur. 9	"	14.35	1.7	2.50	8.39	A. K.	0.45	13	3.37	8.28	
Friday 10	"	14.25	1.7	2.38	8.06	W. W.	0.40	12	3.28	8.54	
Sat. 11	"	14.20	1.6	2.80	8.45	B. W.	8.35	13	4.70	8.50	
Sun. 12	W. W.	15.20	1.8	2.02	8.54	W. W.	0.05	11	3.22	8.36	
Mon. 13	R. J.	14.55	1.6	2.98	8.46	H. T.	0.10	12	3.70	8.75	
Tues. 14	"	14.50	1.7	2.74	8.27	W. W.	0.25	12	4.07	8.21	
Wed. 15	"	14.30	1.6	2.40	8.32	"	0.25	13	3.70	8.05	
Thur. 16	"	14.35	1.5	2.90	7.97	J. L.	0.15	14	4.58	8.14	
Friday 17	W. B.	14.05	1.4	3.00	8.21	H. T.	0.40	13	3.60	8.38	
Mean daily results of period, June 27-July 17		14.35	16.8	2.43	8.39	..	0.25	12.9	3.92	8.28	
Sat. 18	W. W.	14.45	1.4	2.60	8.31	W. W.	0.30	10	2.90	8.24	
Sun. 19	"	14.30	1.5	2.44	8.36	W. B.	0.10	10	3.70	8.03	
Mon. 20	"	14.55	1.5	2.48	8.09	W. W.	0.30	11	4.17	7.90	
Tues. 21	W. B.	14.30	1.4	3.00	8.14	"	0.30	10	3.90	8.15	
Wed. 22	W. W.	14.45	1.5	2.98	8.06	J. H.	0.25	11	4.40	8.30	
Thur. 23	J. H.	14.40	1.4	3.22	8.31	"	0.05	9	3.63	8.23	
Friday 24	R. B.	14.55	1.3	3.08	8.27	R. G. W.	0.15	9	5.04	8.25	
Sat. 25	W. W.	14.25	1.2	2.62	8.39	J. H.	0.35	11	4.60	8.18	
Sun. 26	"	14.30	1.3	2.32	8.38	"	8.50	11	4.18	7.95	
Mon. 27	"	15.20	1.8	2.68	8.38	R. G. W.	8.50	10	4.00	8.09	
Tues. 28	J. H.	14.15	1.5	3.08	8.38	J. H.	0.30	11	3.62	8.49	
Wed. 29	W. W.	14.40	1.5	2.80	8.70	"	0.00	10	3.50	8.34	
Thur. 30	J. H.	14.50	1.6	2.82	8.53	R. B.	0.05	11	3.66	8.50	
Friday 31	"	15.00	1.6	2.58	8.60	J. H.	0.20	10	3.02	8.14	
Mean daily results of period, July 18-31		14.40	14.5	2.76	8.35	..	0.15	10.3	3.89	8.21	
Mean daily results of whole of 2nd period, June 27-July 31		14.40	15.9	2.98	8.39	..	0.20	11.9	3.91	8.26	
Mean daily results of whole experiment (32 days)		..	16.8	2.67	8.51	..	..	12.6	3.59	8.34	

In "season." Bull refused to serve at 8 A.M. and 3 P.M. on June 14.

In "season." Served at 5.30 P.M.

COW No. 14. (GROUP I.) Age, 5 years. Calved, Feb. 21, 1903.

Weight on July 1, 12 cwt. 1 qr. 12 lb.; on July 31, 12 cwt. 2 qr. 6 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	W. W.	17	2.60	9.36	9.36	W. W.	9.15	13	3.40	8.77	
Thur. 11	"	14.20	17	3.20	9.35	"	10.45	12	3.00	9.14	
Friday 12	"	13.35	16	2.53	8.75	"	9.05	12	4.60	8.72	
Sat. 13	"	15.00	16	2.50	8.97	"	9.05	11	3.30	8.97	
Sun. 14	"	15.00	17	3.30	9.22	"	8.40	11	5.20	9.00	
Mon. 15	"	15.20	17	3.75	9.09	"	9.05	11	4.50	8.88	
Tues. 16	"	11.50	15	2.55	9.01	"	9.25	12	3.70	9.20	
Wed. 17	"	15.00	18	3.07	9.28	"	8.55	13	4.67	8.89	
Thur. 18	"	14.40	8*	1.70*	9.10*	"	8.45	10*	4.30*	9.22*	In "season." Served at 11 A.M.
Friday 19	"	15.15	14*	3.60*	9.06*	"	9.05	14*	5.48*	8.88*	
Sat. 20	R. B.	15.00	18	3.35	8.81	"	9.05	13	4.10	8.91	
Sun. 21	W. W.	15.00	17	2.75	9.10	"	8.40	13	3.20	8.46	
Mon. 22	"	15.45	18	2.10	9.01	"	8.30	13	4.57	8.72	
Tues. 23	"	15.00	16	2.40	9.01	"	9.20	13	4.40	8.67	
Wed. 24	"	14.45	15	2.08	8.90	"	9.10	13	4.00	8.74	
Thur. 25	"	14.35	16	2.65	8.80	"	9.35	11	3.15	8.64	
Friday 26	"	14.25	16	2.60	8.80	R. B.	9.20	13	5.05	8.62	
Mean daily results of 1st period		14.50	16	2.74	9.03	..	9.10	13.1	4.29	8.85	
Sat. 27	R. B.	15.00	17	3.60	8.76	R. B.	9.15	11	3.78	8.62	
Sun. 28	"	14.30	18	3.17	8.68	"	8.35	10	4.60	8.92	
Mon. 29	"	15.20	16	3.00	8.69	"	9.15	12	4.44	8.98	
Tues. 30	"	14.40	16	3.17	8.90	"	9.20	11	3.98	8.70	
July.											
Wed. 1	"	14.30	16	2.90	9.07	"	9.30	11	3.80	8.70	
Thur. 2	"	15.00	14	2.30	9.07	"	8.50	12	3.67	8.55	
Friday 3	"	14.40	15	2.62	8.70	"	9.20	12	4.31	8.73	
Sat. 4	"	14.50	15	3.38	8.71	"	9.25	12	5.30	8.47	
Sun. 5	"	14.50	15	2.40	8.92	"	8.35	11	3.90	8.62	
Mon. 6	"	15.20	16	2.97	8.88	"	9.15	12	5.68	8.60	
Tues. 7	"	14.80	15	3.50	9.01	W. W.	9.10	11	4.20	8.60	
Wed. 8	W. W.	14.10	15	2.23	8.91	"	10.05	11	4.18	8.60	
Thur. 9	"	14.30	14	2.30	8.98	N. D.	9.50	9	3.98	8.56	
Friday 10	"	14.10	14	2.27	8.57	W. W.	9.45	14	4.60	8.90	
Sat. 11	"	14.10	18	3.17	8.65	R. B.	9.25	13	5.57	9.40*	In "season"?
Sun. 12	"	15.00	17*	2.98*	8.98*	W. W.	8.50	9	4.10	8.78	
Mon. 13	"	15.00	14	2.50	8.91	"	8.50	7*	3.80*	8.65*	
Tues. 14	"	15.10	18*	2.67*	8.82*	"	9.35	11	4.70	9.05	
Wed. 15	"	14.30	14	2.70	8.63	"	9.35	11	3.62	8.43	
Thur. 16	"	14.20	11	3.00	8.64	"	9.20	10	3.67	8.64	
Friday 17	"	14.30	13	2.40	8.75	"	9.15	10	4.62	8.69	
Mean daily results of period, June 27-July 17		14.40	15.3	2.82	8.82	..	9.15	11.1	4.31	8.66	
Sat. 18	W. W.	15.10	13	2.62	8.90	"	9.05	10	4.00	8.68	
Sun. 19	"	15.00	13	2.90	8.99	"	8.50	9	4.40	8.70	
Mon. 20	"	15.15	15	3.10	8.72	"	9.05	9	5.00	8.71	
Tues. 21	J. H.	14.50	13	1.02	8.99	"	9.25	9	3.62	8.64	
Wed. 22	R. B.	14.30	11	3.00	8.51	"	9.25	9	4.77	8.62	
Thur. 23	W. W.	14.10	11	3.00	8.74	"	9.05	9	4.60	8.78	
Friday 24	"	14.50	10	4.50	8.79*	R. B.	9.35	5	7.20*	8.56*	Some disturbing influence unrecorded. Note especially July 24.
Sat. 25	"	14.30	9	3.82	8.70*	W. W.	9.25	7	5.20*	8.51*	
Sun. 26	"	14.15	9	3.16	8.74*	"	8.45	8	4.98*	8.26*	
Mon. 27	"	15.20	13	2.90	8.61	"	9.10	14	4.22	8.31*	
Tues. 28	"	14.45	13	2.96	8.63	"	9.25	9	4.40	8.72	
Wed. 29	"	15.00	14	2.68	8.75	"	9.00	9	3.83	8.71	
Thur. 30	"	14.40	14	2.67	8.55	R. B.	9.05	10	5.00	8.66	
Friday 31	"	15.00	13	3.00	8.68	W. W.	9.10	9	4.24	8.52	
Mean daily results of period, July 18-31		14.50	12.9	3.23	8.68	..	9.10	9.1	4.78	8.61	
Mean daily results of whole of 2nd period, June 27-July 31		14.45	14.3	2.96	8.77	..	9.15	10.3	4.48	8.64	
Mean daily results of whole experiment (32 days)		..	14.9	2.90	8.86	..	..	11.2	4.42	8.71	

COW No. 15. (GROUP I.) Age, 5 years. Calved, March 22, 1903.

Weight on July 1, 10 cwt. 3 qr. 8 lb.; on July 31, 11 cwt. 1 qr.

DATE.	Milked by	MORNING.					EVENING.					REMARKS.
		Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.		Milked by.	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%		
Wed. 10	J. H.	..	16	3.15	8.87		J. H.	9.10	13	4.90	8.41	In "season." Served at 10 A.M.
Thur. 11	"	14.35	11*	1.75*	8.97*		"	9.30	14*	5.10*	8.21*	
Friday 12	"	14.35	15	2.05	8.80		"	9.15	13	3.90	8.50	
Sat. 13	"	14.50	15½	2.00	8.84		"	9.25	12	3.20	8.70	
Sun. 14	"	14.40	16	2.40	9.01		"	8.35	12	4.20	8.76	
Mon. 15	"	15.15	16	2.45	8.91		"	9.25	12½	3.15	8.54	
Tues. 16	"	14.40	15	2.00	8.74		"	9.25	15	3.30	8.52	
Wed. 17	"	14.30	15	2.34	8.86		"	9.25	12	2.65	8.72	
Thur. 18	"	14.35	15	2.10	8.98		"	9.25	11½	3.25	8.63	
Friday 19	"	14.35	15	2.50	8.61		"	9.15	11½	3.70	8.45	
Sat. 20	"	14.50	13	2.00	8.58		"	9.15	12½	3.15	8.44	
Sun. 21	"	14.35	15	2.80	8.65		"	8.45	10½	3.60	8.05	
Mon. 22	W. W.	15.15	14	2.50	8.30		"	9.15	11½	3.40	8.40	
Tues. 23	J. H.	14.40	14	2.30	8.60		"	9.20	12	3.90	8.19	
Wed. 24	"	14.75	18½	2.18	8.45		"	9.40	10½	2.82	8.42	
Thur. 25	"	14.15	14	2.15	8.14		"	9.25	10	3.60	8.34	
Friday 26	"	14.35	12½	2.00	8.20		"	9.20	9½	3.15	8.10	
Mean daily results of 1st period		14.40	14.4	2.36	8.69	..		9.15	11.8	3.60	8.51	
Sat. 27	J. H.	14.50	13	2.30	8.26		J. H.	9.10	9½	3.37	8.23	
Sun. 28	"	14.50	13	3.27	8.19		"	8.30	8½	4.40	8.41	
Mon. 29	"	15.00	13	2.45	8.16		"	9.15	10	4.20	8.30	
Tues. 30	"	14.45	12½	2.50	8.48		"	9.15	10	4.10	8.41	
July.												
Wed. 1	"	14.25	12	2.47	8.48		"	9.20	10½	3.57	8.48	
Thur. 2	"	14.55	12	1.85	8.59	R. B.	"	9.20	10	2.63	8.23	
Friday 3	"	14.45	12	3.10	8.28	J. H.	"	9.15	10	3.58	8.20	
Sat. 4	R. B.	14.45	12½	2.57	8.40	"	"	9.10	9	4.20	8.48	
Sun. 5	J. H.	14.50	12½	2.70	8.56	"	"	8.40	9	4.10	8.28	
Mon. 6	"	15.10	12½	2.84	8.64	L. W.	"	9.30	8½	1.82*	8.74	
Tues. 7	"	14.25	12½	3.47*	8.69	W. W.	"	9.30	8	2.54*	8.77	
Wed. 8	"	15.00	12	2.18	8.58	J. H.	"	9.15	9½	4.82	8.28	
Thur. 9	"	14.35	12½	3.28	8.22	"	"	9.30	9	3.37	8.56	
Friday 10	"	14.25	12½	2.87	8.21	W. W.	"	9.40	9	3.40	8.55	
Sat. 11	"	14.25	11½	2.90	8.47	R. B.	"	8.10	9½	4.80	9.00	
Sun. 12	"	15.55	12½	2.50	8.81	L. L. W.	"	8.30	9	3.10	8.56	
Mon. 13	"	15.30	12	3.35	8.63	L. T.	"	9.00	8	2.87	8.50	
Tues. 14	"	15.05	13	2.57	8.50	J. H.	"	9.10	10	4.70	8.77	
Wed. 15	"	14.55	11½	2.80	8.05	W. B.	"	9.10	9	3.38	8.54	
Thur. 16	W. W.	14.50	12	2.78	8.07	J. H.	"	9.00	9	4.70	8.61	
Friday 17	"	14.40	11½	1.86	8.71	"	"	9.25	9	3.80	8.60	
Mean daily results of period, June 27-July 17		14.50	12.3	2.07	8.48	..		9.10	9.2	3.62	8.51	
Sat. 18	W. W.	15.00	13	2.60	8.73	J. H.	"	9.00	8	4.10	8.50	
Sun. 19	J. H.	14.45	12	3.23	8.72	L. L. W.	"	8.50	8	2.87	8.81	
Mon. 20	W. B.	15.20	12	2.66	8.65	J. H.	"	9.10	8	2.92	8.68	
Tues. 21	J. H.	14.30	11½	2.70	8.65	"	"	9.30	9	3.27	8.61	
Wed. 22	"	14.45	11½	2.78	8.53	L. L. W.	"	9.25	9	3.00	8.70	
Thur. 23	"	14.40	11	3.40	8.77	J. H.	"	9.10	9	3.62	8.54	
Friday 24	R. B.	14.50	11	4.27*	8.81	W. W.	"	9.20	7½	4.30	8.75	
Sat. 25	J. H.	14.20	9½	3.28	8.80	J. H.	"	9.30	8½	3.60	8.75	
Sun. 26	"	14.35	11	3.33	8.91	"	"	8.50	7½	3.08	8.36	
Mon. 27	"	15.10	11	2.60	8.06	"	"	9.20	7½	2.45	9.17	
Tues. 28	W. B.	15.05	14	3.07	8.58	"	"	9.05	9	5.02	8.57	
Wed. 29	J. H.	14.45	12	3.20	8.90	"	"	9.00	9	3.30	8.64	
Thur. 30	"	14.55	12	2.72	8.74	"	"	8.55	10	4.10	8.66	
Friday 31	W. B.	15.15	13	2.67	8.72	"	"	9.25	9½	4.38	8.50	
Mean daily results of whole of 2nd period, June 27-July 31		14.50	12.1	2.82	8.58	..		9.10	9.0	3.64	8.57	
Mean daily results of whole experiment (32 days)		..	12.9	2.67	8.62	..		..	9.9	3.63	8.55	

(Great fluctuations in fat (especially P.M.) during this period.)

COW No. 17. (GROUP II.) Age, 6 years. Calved, March 2, 1903.

Weight on July 1, 11 cwt. 1 qr.; on July 31, 11 cwt. 2 qr.

DATE.	MORNING.					EVENING.					REMARKS
	Milked by.	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	
June.											
Wed. 10	R. B.	R. M.	1b.	%	%	W. W.	R. M.	1b.	%	%	In "season." Served at 3.50 P.M.
Thur. 11	W. W.	14.20	12 ¹ / ₂	3.25 ¹ / ₂	9.80 ¹ / ₂	J. H.	0.20	8 ¹ / ₂	3.25 ¹ / ₂	8.61	
Friday 12	"	14.35	13	2.15	8.92	L. T.	0.05	8	3.00	9.04	
Sat. 13	"	15.00	13 ¹ / ₂	2.30	9.02	A. K.	0.55	7 ¹ / ₂	2.80	8.90	
Sun. 14	W. W.	15.10	12 ¹ / ₂	1.80	8.80	W. B.	0.25	9	3.00	8.78	
Mon. 15	R. B.	15.25	13	2.05	8.96	L. T.	0.65	7 ¹ / ₂	3.10	8.98	In "season"?
Tues. 16	W. W.	15.05	12 ¹ / ₂	2.10	8.58	W. W.	0.20	8	3.10	8.88	
Wed. 17	R. B.	14.45	12	2.35	9.96	W. B.	0.45	6 ¹ / ₂	2.24 ¹ / ₂	8.06 ¹ / ₂	
Thur. 18	"	15.10	15 ¹ / ₂	1.90 ¹ / ₂	9.05 ¹ / ₂	J. L.	0.25	9 ¹ / ₂	3.70	8.85	
Friday 19	W. B.	15.40	12 ¹ / ₂	1.65	8.72	L. W.	0.45	11 ¹ / ₂	2.60 ¹ / ₂	8.68	
Sat. 20	B. W.	14.50	10 ¹ / ₂	1.85	8.99	II. T.	0.35	9	1.70 ¹ / ₂	8.88	In "season"?
Sun. 21	W. B.	14.05	12	2.10	9.06	W. B.	0.05	9	3.00	8.71	
Mon. 22	R. B.	15.50	14 ¹ / ₂	2.70	8.65	L. W.	0.25	8	4.50	8.61	
Tues. 23	W. W.	15.25	11	1.85	8.93	W. W.	0.15	8 ¹ / ₂	2.65	8.87	
Wed. 24	"	14.50	10 ¹ / ₂	3.15	8.77	N. D.	0.40	4 ¹ / ₂	4.85 ¹ / ₂	8.18 ¹ / ₂	
Thur. 25	R. B.	15.05	9 ¹ / ₂	3.65 ¹ / ₂	8.60 ¹ / ₂	W. B.	0.20	8 ¹ / ₂	4.10 ¹ / ₂	8.20 ¹ / ₂	In "season"?
Friday 26	"	14.45	9 ¹ / ₂	2.50 ¹ / ₂	8.51 ¹ / ₂	"	0.00	7	3.07	8.23 ¹ / ₂	
Mean daily results of 1st period		14.55	12.1	2.37	8.91	..	9.00	7.9	3.19	8.70	
Note low fat. Below 2 per cent on 5 mornings. Below 3 per cent on 6 evenings.											
Sat. 27	R. J.	14.40	11	2.37	8.56	R. B.	0.40	8	3.16	8.52	In "season." Served at 9.30 A.M. Kept in all day.
Sun. 28	W. B.	14.25	10 ¹ / ₂	2.25	8.63	W. B.	0.35	7	2.13	8.37	
Mon. 29	"	15.50	12 ¹ / ₂	1.90	8.63	R. B.	0.10	9	3.27	8.71	
Tues. 30	"	14.10	10 ¹ / ₂	2.23	8.77	W. B.	0.15	8	2.42	8.78	
July.											
Wed. 1	A. K.	14.55	11 ¹ / ₂	1.87	8.79	J. H.	0.85	9	3.10	9.06	In "season." Served at 9.30 A.M. Kept in all day.
Thur. 2	W. B.	13.45	7 ¹ / ₂	3.10 ¹ / ₂	9.18 ¹ / ₂	L. W.	0.30	5 ¹ / ₂	4.28 ¹ / ₂	8.67 ¹ / ₂	
Friday 3	A. K.	14.50	8 ¹ / ₂	3.10 ¹ / ₂	8.54 ¹ / ₂	A. K.	0.00	5	3.70	8.46	
Sat. 4	"	15.30	11	2.17	8.05	S. F.	0.50	5	3.27	8.54	
Sun. 5	L. L. W.	14.40	10	2.40	8.05	L. L. W.	0.45	7 ¹ / ₂	3.60	8.66	
Mon. 6	"	15.20	10	1.80	8.38	L. W.	0.25	9	3.88	8.79	In "season." Served at 9.30 A.M. Kept in all day.
Tues. 7	"	14.35	9 ¹ / ₂	1.77	8.41	B. W.	0.25	8	3.18	8.73	
Wed. 8	"	14.25	10 ¹ / ₂	2.00	8.50	L. W.	0.35	8	3.05	8.61	
Thur. 9	"	14.25	9 ¹ / ₂	1.78	8.48	S. F.	10.05	8	2.52	8.52	
Friday 10	"	13.40	9	1.90	8.45	W. B.	0.50	8 ¹ / ₂	3.10	8.63	
Sat. 11	"	14.35	10	2.23	8.64	L. W.	0.10	7	5.40 ¹ / ₂	9.14 ¹ / ₂	In "season." Served at 9.30 A.M. Kept in all day.
Sun. 12	W. B.	15.50	9	2.10	8.91	L. L. W.	0.40	7 ¹ / ₂	3.05	8.67	
Mon. 13	L. L. W.	15.00	9 ¹ / ₂	2.20	8.90	S. F.	0.50	7 ¹ / ₂	3.40	8.55	
Tues. 14	"	14.10	10	2.00	8.55	W. B.	0.20	7	3.60	8.72	
Wed. 15	W. W.	15.40	9 ¹ / ₂	2.05	8.60	"	0.30	6 ¹ / ₂	3.80	8.26	
Thur. 16	L. L. W.	14.45	9 ¹ / ₂	2.18	8.50	J. II.	0.55	6 ¹ / ₂	3.78	8.57	In "season." Served at 3.45 P.M.
Friday 17	"	14.25	8 ¹ / ₂	2.54	8.53	"	0.20	5 ¹ / ₂	4.30	8.25	
Mean daily results of period, June 27 - July 17		14.45	9.9	2.11	8.66	..	9.15	7.6	3.19	8.62	
Note low fat. Below 2 per cent on 6 mornings. Below 3 per cent on 3 evenings.											
Sat. 18	L. L. W.	11.25	7	2.02	8.90	L. L. W.	0.25	6	3.40	8.32	In "season." Served at 3.45 P.M.
Sun. 19	J. II., W. W.	11.25	7	2.10	8.77	"	0.05	5 ¹ / ₂	3.98	8.37	
Mon. 20	L. L. W.	15.25	8	2.70	8.90	W. B.	0.80	5	3.58	8.66	
Tues. 21	"	14.85	9	2.52	8.45	L. L. W.	0.20	5	3.40	8.55	
Wed. 22	J. H.	15.05	7 ¹ / ₂	2.60	8.74	"	0.40	5	3.18	8.55	
Thur. 23	W. B.	15.05	7 ¹ / ₂	2.10	8.54	W. B.	0.30	4	3.12	8.91	In "season." Served at 3.45 P.M.
Friday 24	L. L. W.	15.20	9	2.08	8.37	"	0.05	4	4.17	8.08	
Sat. 25	"	14.50	8 ¹ / ₂	2.48	8.33	"	0.35	5	3.10	8.64	
Sun. 26	W. B.	14.45	8 ¹ / ₂	2.40	8.77	"	0.30	5	3.40	8.04	
Mon. 27	"	15.20	9	2.20	8.90	L. L. W.	0.10	6 ¹ / ₂	3.13	8.47	
Tues. 28	L. L. W.	14.50	9	2.12	8.66	"	0.55	5	3.58	8.53	In "season." Served at 3.45 P.M.
Wed. 29	"	15.00	9	2.50	8.59	"	0.55	5	3.80	9.00	
Thur. 30	"	14.40	9	2.10	8.75	"	0.20	5 ¹ / ₂	2.78	8.64	
Friday 31	"	14.30	9 ¹ / ₂	2.50	8.91	W. B.	0.15	5 ¹ / ₂	3.00	8.50	
Mean daily results of period, July 18-31		14.50	8.4	2.35	8.64	..	9.05	5.1	3.39	8.56	
Mean daily results of whole of 2nd period, June 27-July 31		14.45	9.3	2.22	8.65	..	9.10	5.6	3.45	8.61	
Mean daily results of whole experiment (63 days)		..	10.2	2.27	8.74	7.0	3.46	8.64	

COW No. 18. (Group III.) Age, 8 years. Calved, March 9, 1902. (Geld.)

Weight on July 1, 12 cwt. 1 qr.; on July 31, 12 cwt. 1 qr. 12 lb.

DATE.	Milked by	MORNING.				EVENING.				REMARKS.	
		Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.		
June.		H. M.	lb.	%	%	H. M.	lb.	%	%		
Wed. 10	W. W.	..	8½	3.20	9.00	W. W.	9.25	5	8.70	8.45	
Thur. 11	R. B.	14.20	7	3.80	9.12	J. H.	9.40	5	3.45	8.58	
Friday 12	"	14.30	7½	8.70	9.78	"	9.20	5	3.20	8.78	
Sat. 13	W. W.	14.45	6	2.60	8.93	L. W.	8.40	5½	3.40	8.67	
Sun. 14	"	15.15	7½	2.50	9.07	W. B.	8.10	5	4.30	8.57	
Mon. 15	J. H.	15.43	8	3.75	9.01	N. D.	9.10	5½	3.00	8.81	
Tues. 16	R. B.	15.05	8½	4.50	8.90	W. W.	9.20	4	3.40	8.75	
Wed. 17	W. W.	14.40	7	2.90	9.14	W. B.	9.20	5½	4.50	8.67	
Thur. 18	W. B.	16.25	7	3.10	9.15	(A. K. B. W.)	8.50	6	4.80	8.75	
Friday 19	"	14.10	6	3.15	8.70	W. W.	10.10	6	3.60	8.60	
Sat. 20	R. J.	14.15	7	3.00	8.71	N. D.	9.25	4	1.80	9.12	
Sun. 21	W. B.	14.05	7	2.80	8.55	W. B.	9.20	6½	4.55	8.37	
Mon. 22	J. H.	16.10	8	4.15	8.74	B. W.	9.35	4½	4.00	8.91	
Tues. 23	W. B.	18.55	6	3.70	8.92	W. W.	10.10	4½	2.92	8.97	
Wed. 24	R. B.	14.45	8	3.90	8.79	S. F.	9.30	4	8.03	8.54	
Thur. 25	W. W.	15.15	8½	3.60	8.43	W. B.	8.40	5½	4.40	8.44	
Friday 26	J. H.	15.20	8	3.70	8.66	"	8.20	5	3.48	8.53	
Mean daily results of 1st period			14.50	7.4	3.43	8.91	..	9.10	5.1	8.75	8.73
Sat. 27	W. B.	14.40	8	3.02	8.95	R. J.	9.35	4½	4.78	8.54	In "season."
Sun. 28	"	14.45	4½	2.20	8.60	W. B.	8.40	7½	4.60	8.51	
Mon. 29	"	16.05	7½	4.10	8.50	"	10.00	6½	5.00	8.39	
Tues. 30	"	14.05	6½	8.60	8.81	"	9.15	5	8.90	8.55	
July.											
Wed. 1	"	14.50	7	2.92	8.85	S. F.	9.50	4	3.22	8.54	In "season." Note low yield A.M. and high yield and fat P.M.
Thur. 2	A. K.	14.25	7	3.28	9.18	J. L.	9.10	6	5.07	8.24	
Friday 3	"	14.35	8½	2.60	8.66	L. W.	9.50	7	4.80	8.35	
Sat. 4	R. J.	15.05	7	3.78	8.54	R. G. W.	8.55	4½	3.10	8.54	
Sun. 5	L. L. W.	14.35	6½	2.10	8.71	L. L. W.	9.20	5½	3.90	8.47	
Mon. 6	"	16.45	5	3.22	8.40	B. W.	8.55	7	5.70	8.37	
Tues. 7	"	14.05	4	2.68	8.50	W. W.	10.15	6	3.30	8.38	
Wed. 8	"	14.10	6	2.62	8.71	H. T.	9.30	7	5.64	8.26	
Thur. 9	"	14.25	1	2.38	8.77	S. F.	9.40	5	2.90	8.82	
Friday 10	"	14.10	5	3.10	8.68	W. B.	9.20	5	4.70	8.39	
Sat. 11	"	15.10	1½	3.62	8.20	L. W.	8.10	7	7.25	9.10	
Sun. 12	W. B.	15.15	1½	1.20	8.75	L. L. W.	9.05	2	2.00	8.31	
Mon. 13	L. L. W.	15.10	1½	7.30	8.05	S. F.	9.10	5½	5.40	8.30	
Tues. 14	"	14.50	7	2.90	8.47	W. B.	9.20	7	4.98	8.92	
Wed. 15	R. J.	15.20	7½	8.66	8.78	"	8.30	4½	4.63	8.14	
Thur. 16	L. L. W.	15.05	5½	2.50	8.57	J. H.	9.50	6½	5.73	8.65	
Friday 17	"	13.35	8½	3.30	8.28	"	10.05	5½	4.70	9.05	
Mean daily results of 2nd period, June 27-July 17			14.48	5.6	8.00	8.64	..	9.20	5.5	4.56	8.54
Sat. 18	L. L. W.	14.35	7	3.40	8.92	L. L. W.	8.55	5½	5.24	8.70	Great variations in fat per cent during this period
Sun. 19	W. W.	15.40	6	4.02	8.92	"	7.55	4½	4.40	8.47	
Mon. 20	L. L. W.	15.20	5	2.22	8.98	W. B.	9.35	5½	5.50	8.78	
Tues. 21	W. B.	14.50	5	8.98	8.88	L. L. W.	9.00	4½	3.77	8.67	
Wed. 22	R. B.	15.35	6	4.50	8.66	"	8.15	3	3.18	8.53	
Thur. 23	L. L. W.	14.45	4½	2.30	8.75	R. G. W.	9.15	5	7.65	9.00	
Friday 24	"	14.50	6	2.50	8.19	W. B.	9.25	5	6.18	8.55	
Sat. 25	"	15.30	4	3.22	8.56	"	9.40	5½	3.50	8.71	
Sun. 26	W. B.	14.10	5	3.55	8.72	"	9.00	1	3.98	8.67	
Mon. 27	"	15.15	6	4.12	8.36	L. L. W.	9.15	4	3.10	8.48	
Tues. 28	L. L. W.	14.50	5	3.08	8.90	"	9.20	4	3.70	8.70	
Wed. 29	"	14.35	4	2.77	8.51	"	9.00	4	4.48	8.73	
Thur. 30	"	14.35	4½	4.10	8.88	"	9.50	8½	8.68	8.42	
Friday 31	"	14.30	4½	3.60	8.91	R. G. W.	10.15	3	7.32	8.70	
Mean daily results of 3rd period, July 18-31			14.50	5.1	8.88	8.71	..	9.10	5.4	4.13	8.60
Mean daily results of whole of 2nd period, June 27-July 31			14.43	5.3	8.19	8.65	..	9.15	5.1	4.51	8.60
Mean daily results of whole experiment (52 days)			..	6.0	3.27	8.76	5.1	4.28	8.61

COW No. 19. (GROUP IV.) Age, 5 years. Calved, April 27, 1903.

Weight on July 1, 10 cwt. 2 qr.; on July 31, 10 cwt. 2 qr.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	Milked by	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%			H. M.	lb.	%		
Wed. 10	W. W.		22	2.60	9.21	W. W.	9.20	20	4.10	9.14	
Thur. 11	"	14.20	21	2.20	9.48	"	9.35	19½	4.10	9.11	
Friday 12	"	14.35	23	3.10	9.16	"	9.30	16½	5.90	8.87	
Sat. 13	"	14.30	22	2.80	9.02	"	9.45	18	4.20	8.93	
Sun. 14	"	14.20	21	8.05	9.35	"	8.40	17	6.05	8.70	
Mon. 15	"	15.25	20	2.15	9.06	"	9.10	17	3.75	9.06	
Tues. 16	"	14.40	21	2.10	9.14	"	9.20	15½	4.30	9.12	
Wed. 17	"	14.55	21	2.80	9.05	"	9.00	16½	4.10	9.06	
Thur. 18	"	14.50	22	3.05	9.11	"	9.10	16	5.00	9.21	
Friday 19	"	14.15	21	2.65	9.02	"	9.20	17	4.58	8.88	
Sat. 20	"	15.45	22½	3.20	8.98	"	8.20	16	4.60	9.06	
Sun. 21	"	14.85	21	2.38	9.11	"	8.55	16	3.80	8.85	
Mon. 22	"	15.15	20	1.80	9.25	"	9.20	16½	4.10	9.30	
Tues. 23	"	14.40	23	2.70	8.92	"	9.15	16½	4.78	8.71	
Wed. 24	"	14.35	21	9.32	9.10	"	9.40	18½	4.82	8.70	
Thur. 25	"	14.15	19	2.41	8.85	"	9.25	16½	4.40	8.60	
Friday 26	"	14.45	20	2.60	8.88	R. B.	9.15	17	5.80	8.67	
Mean daily results of 1st period		14.45	21.2	2.54	9.13	..	9.15	17.0	4.40	8.98	
Sat. 27	R. B.	14.55	20	2.94	9.01	R. B.	9.10	18	5.20	8.52	
Sun. 28	"	14.40	19½	2.78	8.93	"	8.25	14½	4.80	8.43	
Mon. 29	"	15.40	19½	2.40	8.97	"	9.20	16½	4.70	8.80	
Tues. 30	"	14.35	19½	2.93	9.08	"	9.25	15½	4.00	8.64	
July.											
Wed. 1	"	14.30	19½	2.90	8.82	"	9.40	15	3.97	9.19	
Thur. 2	"	14.30	19	2.70	8.86	"	9.35	17	4.69	8.45	
Friday 3	W. B.	14.25	19	2.89	8.70	"	9.25	16	5.00	8.61	
Sat. 4	R. B.	14.50	19	2.55	8.98	"	9.25	15	4.60	8.41	
Sun. 5	"	14.35	17	2.80	9.00	"	8.50	14	4.80	8.47	
Mon. 6	"	15.05	18	2.30	9.33	"	9.25	15	4.40	8.19	
Tues. 7	W. W.	15.20	15½	1.72*	8.38*	W. W.	9.40	17½	4.20*	8.33*	In "season"?
Wed. 8	"	14.50	17	2.60	8.41	"	9.20	11	4.78	8.27	
Thur. 9	"	14.20	17	8.00	8.86	"	9.40	15½	5.19	8.80	
Friday 10	"	14.15	16	2.87	8.81	"	9.40	14½	3.98	8.67	
Sat. 11	"	14.15	18*	1.72*	8.91*	"	8.55	18*	4.80*	9.18*	In "season." Served at 1.30 P.M. Kept in all day.
Sun. 12	"	15.45	18*	2.80*	9.03*	"	8.15	13*	5.00*	8.71*	
Mon. 13	"	15.10	17	2.85	8.84	W. B.	9.15	14	4.58	8.78	
Tues. 14	"	14.50	15	2.40	9.00	W. W.	9.15	14	4.80	9.15	
Wed. 15	"	14.40	14	1.90	9.02	"	9.15	14	4.48	8.82	
Thur. 16	"	14.50	16	2.70	8.68	"	9.10	12½	4.98	8.70	
Friday 17	"	14.40	15	2.02	8.90	"	9.20	15	5.52	8.89	
Mean daily results of 2nd period, June 27-July 17		14.45	18.4	2.54	8.84	..	9.15	14.9	4.71	8.68	
Sat. 18	W. W.	14.40	13	1.98	8.96	W. W.	9.25	14	3.90	8.73	
Sun. 19	"	15.05	16	2.67	9.04	"	8.35	11	2.87	8.79	
Mon. 20	"	15.10	15	2.28	8.70	"	9.25	12	4.10	8.66	
Tues. 21	"	14.30	14½	2.78	8.92	"	9.80	12	4.92	8.57	
Wed. 22	"	14.35	14½	2.68	8.60	"	9.05	11	4.54	8.72	
Thur. 23	"	14.45	12½	2.80	8.95	"	9.25	12½	4.10	8.71	
Friday 24	R. B.	14.40	15	3.60	8.63	"	9.40	10	4.20	8.86	
Sat. 25	W. W.	13.45	13	2.25	8.91	"	9.45	14	4.00	8.64	
Sun. 26	"	14.45	14	3.00	8.98	"	8.40	10	5.70	8.93	
Mon. 27	"	15.10	16½	3.07	8.85	"	9.25	12	4.38	8.67	
Tues. 28	"	14.55	16½	3.00	8.37	"	9.10	12	5.04	8.65	
Wed. 29	"	14.35	15½	2.70	8.78	"	9.10	13½	5.79	8.74	
Thur. 30	"	14.50	15	2.80	8.90	R. B.	9.20	18	5.12	8.59	
Friday 31	"	14.50	15	2.50	9.04	W. W.	9.15	12	4.40	8.67	
Mean daily results of 3rd period, July 18-31		14.45	14.7	2.70	8.85	..	9.15	12.1	4.65	8.69	
Mean daily results of whole of 2nd period, June 27-July 31		14.45	16.9	2.61	8.85	..	9.15	13.8	4.60	8.68	
Mean daily results of whole experiment (52 days)		..	18.3	2.59	8.94	..	..	14.9	4.62	8.76	

COW No. 18. (GROUP III.) Age, 8 years. Calved, March 9, 1902. (Geld.)

Weight on July 1, 12 cwt. 1 qr.; on July 31, 12 cwt. 1 qr. 12 lb.

DATE.	Milked by	MORNING.					EVENING.					REMARKS.
		Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.		Milked by	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.	%	%			H. M.	lb.	%	%	
Wed. 10	W. W.	14.20	8½	3.20	8.00		W. W.	9.25	5	3.70	8.45	
Thur. 11	R. B.	14.20	7	3.30	8.12		J. H.	9.40	5	3.45	8.53	
Friday 12	"	14.30	7½	3.70	8.78		"	9.20	5	3.20	8.78	
Sat. 13	W. W.	14.45	6	2.00	8.98		L. W.	8.40	6½	3.40	8.87	
Sun. 14	"	15.15	7½	2.80	9.07		W. B.	8.10	5	4.30	8.87	
Mon. 15	J. H.	15.45	8	3.75	9.01		N. D.	9.10	5½	3.00	8.61	
Tues. 16	R. B.	15.05	8½	3.50	9.00		W. W.	9.20	4	3.40	8.75	
Wed. 17	W. W.	14.40	7	2.90	9.14		W. B.	9.20	5½	4.80	8.57	
Thur. 18	W. B.	15.25	7	3.10	9.15	(A. K. B. W.)	"	8.50	6	4.90	8.75	
Friday 19	"	14.10	6	3.15	8.70		W. W.	10.10	6	3.00	8.00	
Sat. 20	R. J.	14.15	7	3.90	8.71		N. D.	9.25	4	3.50	8.92	
Sun. 21	W. B.	14.05	7	2.70	8.65		W. B.	9.20	6½	4.55	8.57	
Mon. 22	J. H.	16.10	8	4.15	8.74		B. W.	9.35	4½	4.00	9.01	
Tues. 23	W. B.	13.55	6	3.70	8.92		W. W.	10.40	4½	2.92	8.07	
Wed. 24	R. B.	14.45	8	3.00	8.79		S. F.	8.30	4	3.08	8.54	
Thur. 25	W. W.	15.15	8½	3.60	8.48		W. B.	8.40	5½	4.40	8.44	
Friday 26	J. H.	15.20	8	3.70	8.65		"	8.20	5	3.48	8.53	
Mean daily results of 1st period		14.50	7.4	3.43	8.91	..		9.10	5.1	3.75	8.73	
Sat. 27	W. B.	14.40	8	3.02	8.85		R. J.	9.35	1½	3.78	8.54	In "season."
Sun. 28	"	14.45	4½	2.20	8.60		W. B.	8.40	7½	4.60	8.51	
Mon. 29	"	15.05	7½	4.10	8.50		"	10.00	6½	5.00	8.39	
Tues. 30	"	14.05	6½	3.60	8.81		"	9.15	5	3.90	8.55	
July.												
Wed. 1	"	14.50	7	2.92	8.85		S. F.	9.50	4	3.22	8.54	
Thur. 2	A. K.	14.25	7	3.28	9.18		J. L.	9.10	6	5.67	8.24	
Friday 3	"	14.55	5½	2.60	8.66		L. W.	8.50	7	4.80	8.35	
Sat. 4	R. J.	15.05	7	3.74	8.54		R. G. W.	8.55	4½	3.10	8.54	
Sun. 5	L. L. W.	14.35	6½	2.10	8.71		L. L. W.	9.20	5½	3.90	8.47	
Mon. 6	"	15.45	5	3.22	8.49		B. W.	8.53	7	5.70	8.67	
Tues. 7	"	14.05	4	2.68	8.50		W. W.	10.15	6	3.80	8.38	
Wed. 8	"	14.10	6	2.62	8.71		H. T.	9.30	7	5.84	8.26	
Thur. 9	"	14.25	4	2.38	8.77		S. F.	9.40	5	2.00	8.62	
Friday 10	"	14.10	5	3.10	8.86		W. B.	9.20	5	4.70	8.38	
Sat. 11	"	15.10	3½	3.62	8.26		L. W.	8.10	7	7.25	9.19	In "season"? Note low yield a.m. and high yield and fat p.m.
Sun. 12	W. B.	15.15	5½	3.20	8.75		L. L. W.	9.05	3	2.00	8.39	
Mon. 13	L. L. W.	15.10	4½	3.30	8.75		S. F.	9.10	5½	5.40	8.69	
Tues. 14	"	14.50	5	2.90	8.37		W. B.	9.20	5	4.08	8.62	
Wed. 15	R. J.	15.20	7½	3.60	8.75		"	8.20	4½	4.68	8.14	In "season?"
Thur. 16	L. L. W.	15.05	7½	2.40	8.57		J. H.	9.50	6½	5.72	8.65	
Friday 17	"	13.35	3	3.30	8.24		"	10.05	5½	4.70	9.05	
Mean daily results of period, June 27-July 17		14.45	5.6	3.06	8.61	..		9.20	5.5	4.56	8.54	
Sat. 18	L. L. W.	14.35	7	3.40	8.92		L. L. W.	8.55	5½	5.24	8.79	
Sun. 19	W. W.	15.10	6	4.02	8.92		"	7.55	4½	4.40	8.47	
Mon. 20	L. L. W.	15.20	5	2.23	8.98		W. B.	8.35	5½	5.50	8.78	
Tues. 21	W. B.	14.50	5	3.04	8.88		L. L. W.	9.00	4½	3.77	8.67	
Wed. 22	R. B.	15.35	6	4.50	8.66		"	8.15	3	3.18	8.53	
Thur. 23	L. L. W.	14.45	4½	2.80	8.75		R. G. W.	9.15	5½	5.68	9.00	
Friday 24	"	14.50	6	2.50	8.49		W. B.	9.25	5	6.18	8.55	
Sat. 25	"	14.30	4	2.22	8.56		"	9.40	5½	3.50	8.71	
Sun. 26	W. B.	14.10	5	3.58	8.72		"	9.00	4	3.98	8.67	
Mon. 27	"	15.15	6	4.12	8.56		L. L. W.	9.15	4	3.40	8.42	
Tues. 28	L. L. W.	14.50	5	3.08	8.60		"	9.20	4	3.76	8.79	
Wed. 29	"	14.35	4	2.77	8.51		"	9.00	4	4.48	8.73	
Thur. 30	"	14.35	4½	4.10	8.88		"	9.50	8½	8.68	8.42	
Friday 31	"	14.30	4½	3.60	8.91		R. G. W.	10.15	3	5.32	8.79	
Mean daily results of period, July 18-31		14.50	5.1	3.88	8.71	..		9.10	4.4	4.43	8.69	
Mean daily results of whole of 2nd period, June 27-July 31		14.45	5.3	3.19	8.68	..		9.15	5.1	4.51	8.60	P. M. Great variations in fat per cent during this period.
Mean daily results of whole experiment (92 days)		..	6.0	3.27	8.76	..		..	5.1	4.26	8.61	

COW No. 19. (GROUP IV.) Age, 5 years. Calved, April 27, 1903.

Weight on July 1, 10 cwt. 2 qr.; on July 31, 10 cwt. 2 qr.

DATE.	Milked by	MORNING.				Milked by	EVENING.				REMARKS.
		Interval milked last milking	Milk-yield.	Fat.	Solids-not-fat.		Interval milked last milking	Milk-yield.	Fat.	Solids-not-fat.	
June.		H. M.	lb.				H. M.	lb.			
Wed. 10	W. W.	..	22	2.50	0.21	W. W.	9.20	20	4.10	0.14	
Thur. 11	"	14.20	21	2.20	0.48	"	9.35	19 ¹	4.10	0.11	
Friday 12	"	14.35	23	3.10	0.16	"	9.30	16 ¹	3.00	0.57	
Sat. 13	"	14.30	22	2.80	0.02	"	9.45	18	4.20	0.93	
Sun. 14	"	14.20	21	3.05	0.35	"	8.40	17	6.05	0.70	
Mon. 15	"	15.25	20	2.15	0.06	"	9.10	17	3.75	0.06	
Tues. 16	"	14.40	31	2.10	0.44	"	9.20	15 ¹	4.30	0.12	
Wed. 17	"	14.55	21	2.80	0.05	"	9.00	15 ¹	4.10	0.08	
Thur. 18	"	14.50	22	3.05	0.41	"	9.10	16	5.00	0.21	
Friday 19	"	14.45	21	2.65	0.02	"	9.20	17	4.58	0.88	
Sat. 20	"	15.45	22 ¹	3.20	0.08	"	8.20	16	1.60	0.06	
Sun. 21	"	14.35	21	2.33	0.11	"	8.55	16	3.80	0.55	
Mon. 22	"	15.15	20	1.80	0.25	"	9.20	16 ¹	1.10	0.30	
Tues. 23	"	14.40	23	2.70	0.02	"	9.15	15 ¹	4.75	0.71	
Wed. 24	"	14.35	21	2.32	0.10	"	9.40	16 ¹	4.62	0.70	
Thur. 25	"	14.15	19	2.41	0.85	"	9.25	16 ¹	4.40	0.69	
Friday 26	"	14.45	20	2.60	0.88	R. B.	9.15	17	5.60	0.57	
Mean daily results of 1st period		14.45	21.2	2.54	0.13	..	9.15	17.0	4.40	0.93	
Sat. 27	R. B.	14.55	20	2.04	0.01	R. B.	9.10	18	5.20	0.52	
Sun. 28	"	14.40	19 ¹	2.73	0.93	"	8.25	14 ¹	4.80	0.43	
Mon. 29	"	15.30	19 ¹	2.40	0.97	"	9.20	16 ¹	4.70	0.80	
Tues. 30	"	14.35	19 ¹	2.93	0.03	"	9.25	15 ¹	4.00	0.64	
July.											
Wed. 1	"	14.30	19 ¹	2.90	0.82	"	9.40	15	3.97	0.49	
Thur. 2	"	14.30	19	2.70	0.86	"	9.35	17	4.69	0.45	
Friday 3	W. B.	14.25	19	2.80	0.70	"	9.25	16	5.00	0.61	
Sat. 4	R. B.	14.50	19	2.55	0.98	"	9.25	15	1.60	0.41	
Sun. 5	"	14.35	17	2.80	0.00	"	8.50	14	4.80	0.47	
Mon. 6	"	15.05	18	2.30	0.33	"	9.25	15	4.40	0.10	
Tues. 7	W. W.	15.20	15 ¹	1.80*	0.33*	W. W.	9.40	17	4.20*	0.33*	In "season"?
Wed. 8	"	14.50	17	2.60	0.41	"	9.20	14	4.78	0.27	
Thur. 9	"	14.20	17	3.00	0.88	"	9.40	15 ¹	5.19	0.80	
Friday 10	"	14.15	16	2.87	0.81	"	9.40	14 ¹	3.48	0.57	
Sat. 11	"	14.15	15*	1.72*	0.91*	"	8.55	13*	4.80*	0.18*	In "season." Served at 1.30 p.m. Kept in all day.
Sun. 12	"	15.45	18*	2.80*	0.03*	"	8.15	13*	5.00*	0.71*	
Mon. 13	"	15.10	17	2.50	0.84	W. B.	9.15	14	4.58	0.73	
Tues. 14	"	14.50	15	2.40	0.00	W. W.	9.15	14	4.80	0.15	
Wed. 15	"	14.40	14	1.90	0.02	"	9.15	14	4.48	0.82	
Thur. 16	"	14.50	16	2.70	0.68	"	9.10	12 ¹	4.08	0.70	
Friday 17	"	14.40	15	2.02	0.90	"	9.20	15	5.52	0.89	
Mean daily results of period, June 27-July 17		14.45	18.4	2.54	0.84	..	9.15	14.9	4.71	0.68	
Sat. 18	W. W.	14.40	13	1.98	0.96	W. W.	9.25	14	3.90	0.75	
Sun. 19	"	15.05	16	2.67	0.04	"	8.35	11	2.87	0.79	
Mon. 20	"	15.10	15	2.24	0.70	"	9.25	12	4.10	0.66	
Tues. 21	"	14.30	14 ¹	2.78	0.92	"	9.30	12	4.92	0.57	
Wed. 22	"	14.35	14 ¹	2.68	0.60	"	9.05	11	4.54	0.72	
Thur. 23	"	14.15	12 ¹	2.30	0.95	"	9.35	12 ¹	4.10	0.71	
Friday 24	R. B.	14.10	15	3.00*	0.63	"	9.40	10	4.20	0.88	
Sat. 25	W. W.	13.45	13	2.28	0.91	"	9.45	14	4.00	0.61	
Sun. 26	"	14.15	14	3.00	0.98	"	8.40	10	5.70	0.65	
Mon. 27	"	15.10	16 ¹	3.07	0.85	"	9.25	12	4.28	0.57	
Tues. 28	"	14.55	16 ¹	3.00	0.57	"	9.10	12	5.06	0.65	
Wed. 29	"	14.35	15 ¹	2.70	0.77	"	9.10	12 ¹	5.79	0.71	
Thur. 30	"	14.50	15	2.80	0.90	R. B.	9.20	18	5.12	0.59	
Friday 31	"	14.50	15	2.50	0.04	W. W.	9.15	12	4.40	0.67	
Mean daily results of period, July 18-31		14.45	14.7	2.70	0.85	..	9.15	12.1	4.65	0.69	
Mean daily results of whole of 2nd period, June 27-July 31		14.45	16.9	2.61	0.85	..	9.15	13.8	4.99	0.68	
Mean daily results of whole experiment (52 days)		..	18.3	2.59	0.94	..	..	14.9	4.63	0.76	

COW No. 20. (GROUP III.) Age, 5 years. Calved, March 3, 1903.

Weight on July 1, 11 cwt.; on July 31 (lame, not weighed).

DATE.	MORNING.					EVENING.					REMARKS.	
	Milked by	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking	Milk-yield.	Fat.	Solids-not-fat.		
June.												
Wed. 10	J. H.	H. M.	lb.	%	%	J. H.	H. M.	lb.	%	%	Served on June 8.	
Thur. 11	"	"	14	2.45	9.08	"	9.25	11	3.65	9.10		
Friday 12	"	"	14.20	2.90	9.45	"	9.30	11	3.40	9.27		
Sat. 13	"	"	14.35	2.65	8.87	"	9.25	10	3.05	8.67		
Sun. 14	"	"	14.40	2.60	8.93	"	9.35	10	3.30	9.02		
Mon. 15	"	"	14.80	2.80	9.20	"	8.40	10	3.95	9.37		
Tues. 16	"	"	13.15	2.25	8.22	"	9.20	11	3.20	8.68		
Wed. 17	"	"	14.40	2.73	8.94	"	9.20	10	3.90	8.81		
Thur. 18	"	"	14.40	2.35	9.03	"	9.20	11	3.62	8.82		
Friday 19	"	"	14.40	1.90	8.95	"	9.15	11	4.05	9.00		
Sat. 20	"	"	14.40	2.70	8.85	"	9.30	10	4.05	8.87		
Sun. 21	"	"	14.25	2.80	8.77	"	9.30	9	3.27	8.73		
Mon. 22	"	"	14.20	2.42	8.39	"	9.15	9	3.40	8.77		
Tues. 23	"	"	15.10	2.40	8.75	"	9.20	11	4.80	8.49		
Wed. 24	"	"	14.40	2.35	8.80	"	9.20	11	4.60	8.63		
Thur. 25	"	"	14.35	2.60	8.66	"	9.40	10	4.15	8.50		
Friday 26	"	"	14.20	2.23	8.62	"	9.20	9	4.00	8.99		
Friday 26	"	"	14.40	2.25	8.63	"	9.20	9	4.10	8.63		
Mean daily results of 1st period			14.40	12.0	2.56	8.92	..	9.20	10.4	3.73	8.64	
Sat. 27	J. H.	"	14.65	1.8	8.71	J. H.	9.20	9	4.08	8.80	In "season." Served at 8 A.M. Kept in all day.	
Sun. 28	"	"	14.05	2.35	8.60	"	9.00	14	3.50	8.56		
Mon. 29	"	"	13.10	1.8	8.53	"	9.30	10	4.70	8.78		
Tues. 30	"	"	14.30	1.8	8.78	"	9.25	10	4.00	8.74		
July.												
Wed. 1	"	"	14.25	1.2	8.22	9.08	"	9.40	11	3.80		8.75
Thur. 2	"	"	14.30	1.2	2.50	8.40	"	9.35	9	3.47		8.78
Friday 3	"	"	14.25	1.2	2.50	8.41	"	9.35	8	3.60		8.66
Sat. 4	"	"	14.80	1.2	2.64	8.62	"	9.25	9	3.68		8.59
Sun. 5	"	"	11.35	1.2	2.60	8.78	"	9.35	10	3.68		8.53
Mon. 6	"	"	15.30	1.2	2.70	8.23	"	9.25	9	4.40		8.67
Tues. 7	"	"	14.30	1.1	2.50	8.22	"	9.35	9	3.80		8.68
Wed. 8	"	"	14.25	1.2	2.70	8.38	"	9.50	9	3.66	8.66	
Thur. 9	"	"	14.15	1.2	2.90	8.55	"	9.35	8	2.66	8.38	
Friday 10	"	"	14.15	1.2	2.90	8.41	"	9.40	9	4.18	8.40	
Sat. 11	"	"	14.25	1.0	2.50	8.68	"	9.50	8	4.20	8.40	
Sun. 12	"	"	11.00	1.0	2.92	8.70	"	9.00	8	1.20	8.65	
Mon. 13	"	"	15.10	1.3	2.92	8.57	"	9.15	8	1.00	8.52	
Tues. 14	"	"	14.15	1.1	2.58	8.40	"	9.25	9	4.11	8.52	
Wed. 15	"	"	14.40	1.2	3.07	8.66	"	9.15	7	1.20	8.33	
Thur. 16	"	"	14.45	1.1	3.25	8.71	"	9.35	8	3.80	8.40	
Friday 17	"	"	14.25	1.0	2.77	8.89	"	9.35	8	1.20	8.43	
Mean daily results of 2nd period, June 27-July 17			14.35	11.7	2.68	8.64	..	9.25	9.2	3.97	8.65	
Sat. 18	J. H.	"	14.20	1.1	3.80	8.60	J. H.	9.25	8	3.80	8.78	Owing to accident A.M. could not be milked.
Sun. 19	"	"	14.40	1.1	3.38	8.92	W. W.	8.15	6	3.00	8.66	
Mon. 20	"	"	15.05	1.1	2.80	8.80	J. H.	9.30	9	1.50	8.78	
Tues. 21	"	"	14.35	1.0	3.08	8.78	"	9.30	8	4.27	8.96	
Wed. 22	"	"	14.30	1.1	3.28	8.82	"	9.30	8	1.07	8.78	
Thur. 23	"	"	14.45	1.0	3.14	9.10	"	9.15	8	4.20	8.76	
Friday 24	W. W.	"	14.45	1.0	2.10	8.36	R. B.	9.50	10	5.10	8.91	
Sat. 25	J. H.	"	13.55	0.9	3.53	9.12	J. H.	9.10	8	1.18	8.83	
Sun. 26	"	"	14.40	1.1	3.10	9.11	"	8.45	8	1.70	9.10	
Mon. 27	"	"	15.05	1.1	2.84	9.09	"	9.25	9	3.84	8.71	
Tues. 28	"	"	14.45	1.1	2.78	9.05	"	9.20	9	4.42	8.94	
Wed. 29	"	"	14.35	1.1	2.80	8.83	"	9.15	9	3.60	9.26	
Thur. 30	"	"	14.50	1.2	2.58	8.34	..	..	..	..
Friday 31	"	"	..	..	..	..	..	..	..	..
Mean daily results of 3rd period, July 18-31			14.40	10.0	2.98	8.66	..	9.20	8.5	4.14	8.89	
Mean daily results of whole of 3rd period, June 27-July 31			14.40	11.4	2.92	8.72	..	9.20	9.0	4.03	8.74	
Mean daily results of whole experiment (52 days)			..	11.0	2.80	8.79	9.5	3.98	8.77	

COW No. 22. (GROUP II.) Age, 5 years. Calved (prematurely, 23 weeks in calf), Dec. 21, 1902. Weight on July 1, 10 cwt. 1 qr. 20 lb.; on July 31, 10 cwt. 1 qr. 6 lb.

DATE.	Milked by.	MORNING.				Milked by.	EVENING.				REMARKS.
		Interval since last milking.	Milk-yield.	Fat.	Solid-not-fat.		Interval since last milking.	Milk-yield.	Fat.	Solid-not-fat.	
June.		H. M.	lb.	%	%		H. M.	lb.	%	%	
Wed. 10	J. H.	12½	3.10	9.04		J. H.	8.30	8½	4.10	9.28	
Thur. 11	"	14.20	11½	3.50	9.64	"	8.30	8	4.00	9.44	
Friday 12	"	14.35	11	3.00	9.10	"	8.55	9	4.00	9.48	
Sat. 13	"	14.80	11½	3.85	9.45	"	8.45	8	3.70	9.12	
Sun. 14	"	14.25	11	3.20	9.28	"	8.45	7	3.90	9.47	
Mon. 15	"	15.10	12	3.30	9.28	"	8.20	8	3.80	9.22	
Tues. 16	"	14.40	11	3.30	9.40	"	8.25	8	4.30	9.80	
Wed. 17	"	14.35	11½	2.77	9.31	"	8.25	9	4.50	9.27	
Thur. 18	"	14.4½	11	3.05	9.70	"	8.20	9	4.40	9.10	
Friday 19	"	14.85	11	2.90	9.37	"	8.80	8½	4.25	9.06	
Sat. 20	"	14.20	11	3.30	9.15	"	8.35	8½	4.27	9.11	
Sun. 21	"	14.20	10½	2.75	9.44	"	8.20	9	4.80	9.80	
Mon. 22	"	15.00	10½	3.00	9.21	"	8.25	8	4.00	9.04	
Tues. 23	"	14.35	11½	3.40	9.22	"	8.20	7	4.10	8.85	
Wed. 24	"	14.35	11½	3.50	9.07	"	8.40	8	4.47	8.73	
Thur. 25	"	14.25	11	3.40	8.65	"	8.20	8	4.80	8.88	
Friday 26	"	14.40	11	3.20	9.16	"	8.30	8	4.20	9.15	
Mean daily results of 1st period		14.35	11.2	3.21	9.26	..	8.25	8.2	4.15	9.12	
Sat. 27	J. H.	14.25	11	3.43	8.98	J. H.	8.30	9	4.18	8.62	
Sun. 28	"	14.30	10	3.07	8.90	"	8.45	8½	4.20	8.70	
Mon. 29	"	15.10	11	3.10	8.71	"	8.25	7½	4.00	8.78	
Tues. 30	"	14.30	11½	3.10	8.92	"	8.30	8	4.10	8.83	
July.											
Wed. 1	"	11.25	11½	3.20	8.88	"	9.10	8½	3.80	8.95	
Thur. 2	"	14.30	11	3.10	8.98	"	8.35	8	3.88	8.84	
Friday 3	"	14.25	12	3.60	8.97	"	8.55	8	4.12	8.84	
Sat. 4	"	14.30	10	3.18	8.95	"	8.80	8	4.00	8.84	
Sun. 5	"	14.35	10	3.60	9.11	"	8.55	8	4.30	8.84	
Mon. 6	"	15.05	11	3.40	8.40	"	8.80	8	4.10	8.65	
Tues. 7	"	14.30	10	3.18	8.63	"	8.30	8½	4.80	8.75	
Wed. 8	"	14.15	11	3.18	9.05	"	10.00	8	4.10	8.88	
Thur. 9	"	14.15	9½	2.90	9.31	"	8.25	8½	3.90	8.65	
Friday 10	"	14.15	11	4.12	9.50	"	8.45	8	4.50	8.84	
Sat. 11	"	14.20	10	2.90	9.02	"	8.00	7½	4.00	8.91	
Sun. 12	"	15.20	11½	3.72	9.00	"	8.40	6½	4.21	8.80	
Mon. 13	"	15.00	10½	3.38	8.92	"	8.20	7½	4.10	8.86	
Tues. 14	"	14.45	11	3.22	9.03	"	8.20	8	4.38	8.67	
Wed. 15	"	14.40	9	2.70	8.28	"	8.20	8	4.38	8.91	
Thur. 16	"	14.30	10½	3.68	8.83	"	8.30	7	3.98	8.90	
Friday 17	"	14.10	9	2.50	9.34	"	8.25	9	4.63	8.76	
Mean daily results of period, July 17		14.35	10.6	3.24	8.91	..	8.20	8.0	4.19	8.83	
Sat. 18	J. H.	11.35	10	3.80	8.82	J. H.	8.25	7	3.98	9.01	
Sun. 19	"	14.10	10	3.58	9.11	W. W.	8.45	7	3.80	9.13	
Mon. 20	"	15.05	10	3.18	9.22	J. H.	8.35	8	4.30	9.05	
Tues. 21	"	14.30	9	3.38	9.09	"	8.30	7½	4.30	9.05	
Wed. 22	"	14.30	9	3.70	9.03	"	8.30	7	4.10	8.76	
Thur. 23	"	14.30	9	3.82	9.15	"	8.25	8	4.18	8.99	
Friday 24	W. W.	14.35	10	3.50	8.87	R. B.	10.00	6	4.10	9.05	
Sat. 25	J. H.	14.15	9	4.07	9.18	J. H.	8.45	7½	4.58	9.20	
Sun. 26	"	14.10	9	3.75	9.13	"	8.50	6½	4.50	9.06	
Mon. 27	"	15.00	10	3.28	9.42	"	8.25	8	4.52	9.09	
Tues. 28	"	14.45	10	3.68	9.20	"	8.20	7	4.14	9.05	
Wed. 29	"	14.35	10	3.27	9.12	"	8.15	8	4.18	9.08	
Thur. 30	"	14.50	11	3.70	8.81	"	8.05	7½	4.10	8.98	
Friday 31	"	14.45	10	3.48	8.88	"	8.30	8	3.92	9.13	
Mean daily results of period, June 27-July 31		14.35	9.7	3.58	9.07	..	8.25	7.4	4.24	9.03	
Mean daily results of whole of 2nd period, June 27-July 31		14.35	10.2	3.38	8.98	..	8.25	7.7	4.21	8.91	
Mean daily results of whole experiment (52 days)		..	10.5	3.32	9.07	..	..	7.9	4.19	8.98	

Put to bull at 8 A.M., but refused to stand. Blood in milk P.M. (July 26).

COW No. 23. (GROUP II.) Age, 5 years. Calved, March, 28, 1903.

Weight on July 1, 10 cwt. 2 qr. 18 lb.; on July 31, 10 cwt. 3 qr. 12 lb.

DATE.	MORNING.					EVENING.					REMARKS.
	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	Milked by.	Interval since last milking.	Milk-yield.	Fat.	Solids-not-fat.	
June.											
Wed. 10	R. B.	H. M.	lb.	%	%	J. H.	H. M.	lb.	%	%	Served June 2.
Thur. 11	"	14.30	24 ¹	2.00	0.25	"	10.35	17	3.80	8.80	
Friday 12	"	18.40	25 ¹	3.80	0.28	"	9.20	17	4.80	8.80	
Sat. 13	"	14.40	21	2.55	0.07	"	9.30	16	3.70	8.02	
Sun. 14	"	14.50	24	2.80	0.07	"	8.40	16	4.20	8.90	
Mon. 15	"	15.00	23	2.80	0.18	W. W.	9.25	14 ¹	3.80	8.05	
Tues. 16	"	14.45	24 ¹	2.87	0.03	J. H.	9.25	15	4.10	8.88	
Wed. 17	"	14.27	24	2.80	0.03	"	9.25	17	4.45	8.88	
Thur. 18	"	14.30	23 ¹	3.10	0.36	J. L.	8.55	19	4.50	9.07	
Friday 19	"	15.25	21	2.50	0.01	"	8.30	19	4.00	8.88	
Sat. 20	"	14.45	21 ¹	3.25	0.06	J. H.	8.45	19	4.20	8.06	
Sun. 21	"	14.45	19 ¹	2.34	0.14	"	9.00	15	3.35	8.22	
Mon. 22	"	15.00	22 ¹	2.10	0.07	W. W.	9.10	17 ¹	4.00	8.73	
Tues. 23	"	14.50	24	3.40	0.81	J. H.	9.25	16	5.15	8.64	
Wed. 24	"	14.40	22 ¹	2.70	0.06	W. W.	8.25	17 ¹	4.10	9.01	In "season." Served at 9 A.M. Kept in all day.
Thur. 25	"	15.15	24	3.60	0.54	J. H.	8.40	16	4.30	8.85	
Friday 26	"	15.25	20 ¹	2.05	0.02	R. B.	9.20	18 ¹	4.55	8.81	
Mean daily results of 1st period		14.45	23	2.86	0.01	..	9.10	16.9	4.11	8.81	
Fat. 27	R. B.	15.00	22	3.03	8.85	J. H.	9.00	14	3.68	8.60	
Sun. 28	"	14.55	24 ¹	2.00	0.80	R. B.	8.80	10 ¹	4.20	8.40	
Mon. 29	"	15.20	24 ¹	3.10	8.78	"	9.15	16 ¹	3.60	8.88	
Tues. 30	"	14.45	23	2.00	8.80	"	9.20	17 ¹	3.32	8.80	
July.											
Wed. 1	"	14.30	22	2.80	8.70	J. H.	9.25	16	4.18	8.85	
Thur. 2	"	15.00	22	2.70	8.96	A. K.	8.45	15	3.68	8.85	
Friday 3	"	15.05	23	2.00	8.77	R. B.	9.10	17	4.20	8.46	
Sat. 4	B. W.	14.50	20 ¹	2.73	8.64	H. T.	9.05	16 ¹	4.10	8.65	
Sun. 5	R. J.	14.55	19	2.60	9.06	R. B.	8.40	10 ¹	4.50	8.50	
Mon. 6	"	14.25	21	2.20	8.20	J. H.	10.15	16	3.40	8.37	
Tues. 7	"	14.30	22	3.34	0.86	"	9.55	16	4.47	8.58	
Wed. 8	"	14.25	22 ¹	2.40	8.62	W. W.	9.85	10	4.00	8.17	
Thur. 9	"	14.30	21 ¹	2.03	8.62	A. K.	9.80	15	4.18	8.80	
Friday 10	"	13.40	21	2.03	8.70	W. B.	10.35	13	3.30	8.58	
Sat. 11	"	14.20	20	2.78	8.68	A. K.	9.00	12 ¹	4.10	8.47	
Sun. 12	J. H.	15.25	23 ¹	2.70	8.00	J. H.	8.30	16 ¹	4.10	8.50	
Mon. 13	R. J.	15.10	20 ¹	3.21	8.70	W. W.	8.50	16	4.10	9.07	
Tues. 14	"	15.10	28 ¹	3.10	8.05	J. H.	9.10	14 ¹	4.50	8.61	
Wed. 15	"	14.20	21	2.60	8.78	"	9.10	14	3.10	8.80	
Thur. 16	"	14.25	22	3.00	8.77	L. W.	9.20	16 ¹	4.10	8.42	
Friday 17	J. H.	14.50	18	3.10	8.88	E. T.	9.05	13	3.62	9.14	
Mean daily results of period, June 27-July 17		14.45	21.8	2.64	8.80	..	9.15	15.3	4.13	8.61	
Sat. 18	L. L. W.	14.50	18 ¹	2.48	8.66	L. L. W.	9.10	14	3.48	8.43	
Sun. 19	J. H.	15.05	19	3.40	8.80	"	8.20	12	3.70	8.86	
Mon. 20	L. L. W.	15.40	19	2.03	8.92	{ J. H., W. B. }	9.20	17 ¹	5.10 ¹	8.68 ¹	In "season"?
Tues. 21	"	13.55	14 ¹	2.37	8.01 ¹	L. L. W.	9.55	17 ¹	3.62 ¹	8.81 ¹	In "season."
Wed. 22	R. B.	14.45	18 ¹	4.10 ¹	8.81 ¹	"	9.45	12	3.40	8.92	
Thur. 23	L. L. W.	14.10	18	2.50	9.14	W. W.	8.20	13	4.50	8.80	
Friday 24	"	15.00	18	2.18	8.30	W. B.	9.25	14	4.62	8.91	
Sat. 25	"	14.30	18 ¹	2.86	9.14	{ W. W., W. B. }	9.20	13	4.32	8.85	
Sun. 26	J. H.	14.45	19	3.50	8.92	W. W.	8.40	13	4.42	8.73	
Mon. 27	"	15.00	15	3.07	8.00	L. L. W.	9.10	14	3.00	8.61	
Tues. 28	L. L. W.	15.00	19	2.50	9.18	"	8.20	13 ¹	5.18 ¹	8.68	
Wed. 29	"	15.30	19	2.72	9.00	"	8.45	14 ¹	4.30	8.78	
Thur. 30	"	15.15	20	2.61	8.84	R. B.	9.05	14 ¹	4.18	8.71	
Friday 31	"	14.50	20 ¹	2.82	9.00	W. W.	9.20	11 ¹	4.40	8.72	
Mean daily results of period, July 18-31		14.55	18.2	2.79	8.92	..	9.05	14.0	4.38	8.78	
Mean daily results of whole of 2nd period, June 27-July 31		14.50	20.4	2.82	8.85	..	9.10	14.6	4.23	8.70	
Mean daily results of whole experiment (52 days)		..	21.3	2.38	8.00	..	..	15.5	4.19	8.74	

MIXED MILK OF THE HERD ("BULK" SAMPLES).

DATE.	MORNING.			EVENING.			REMARKS ON WEATHER, &c.
	Total milk-yield.	Fat.	Solids-not-fat.	Total milk-yield.	Fat.	Solids-not-fat.	
June.	lb.	%	%	lb.	%	%	
Wed. 10	293	2.40	8.82	218	4.05	8.74	Cold night. Dull morn. Later fine. Nos. 2 & 17 in "season."
Thur. 11	268	2.70	9.40	220	3.90	8.90	Cold night. Dull morn. Strong wind. Nos. 6 & 15 in "season."
Friday 12	280	3.10	8.02	211	3.90	8.81	Dull morning.
Sat. 13	208	2.75	9.02	207	3.80	9.00	Morning dull and cool. Heavy rain after 11 a.m.
Sun. 14	277	2.80	9.12	205	4.50	8.88	Rain continuous from 13th. Very cold wind.
Mon. 15	281	2.85	8.18	197	3.80	8.88	Light rain during early morning. Fine towards noon.
Tues. 16	270	2.60	8.80	196	3.10	8.87	Heavy rain during previous night. Fine sunny day. Cows turned into horse pasture.
Wed. 17	278	2.65	9.27	200	3.87	9.06	Morning fine. Rain during afternoon.
Thur. 18	267	2.70	9.20	223	4.80	9.07	Fine day, but rather cool. No. 14 in "season."
Friday 19	258	2.55	9.08	215	3.10	8.79	Cold morning after very cold night.
Sat. 20	260	2.80	8.85	201	3.95	8.96	Fine cold day after cold night.
Sun. 21	265	2.80	8.07	209	3.95	8.73	Sharp frost during night. Fine bright day. No. 9 in "season."
Mon. 22	266	2.18	8.90	211	4.45	8.61	} Sharp frost during night. Fine bright day.
Tues. 23	264	2.48	8.88	197	3.95	8.61	
Wed. 24	256	2.75	8.72	200	4.00	8.71	Fine, bright warm day. No. 23 in "season."
Thur. 25	256	3.08	8.65	191	4.04	8.60	Rain during night. Warm. Thunderstorm in afternoon.
Friday 26	235	2.70	8.70	205	4.50	8.61	Rain all day. Warm. No. 7 in "season."
Sat. 27	250	3.01	8.74	196	3.88	8.55	Fine warm day after wet night.
Sun. 28	254	3.06	8.70	185	4.30	8.38	Fine warm day after warm night. Nos. 18 and 20 in "season."
Mon. 29	264	3.00	8.64	192	4.80	8.55	Fine warm day. Strong westerly wind.
Tues. 30	255	2.00	8.68	185	3.80	8.37	Fine warm day. Slight rain during evening.
July							
Wed. 1	351	2.00	8.79	188	3.80	8.77	Fine hot day. Over 10 hours sunshine recorded.
Thur. 2	341	2.81	8.80	188	4.40	8.40	Fine hot day. Nos. 6 and 17 in "season."
Friday 3	340	2.00	8.67	189	4.10	8.48	Fine day. Strong westerly wind. Heavy rain during previous night. No. 4 in "season."
Sat. 4	242	2.00	8.72	192	4.00	8.57	Cool night and morning. Afternoon fine and warm.
Sun. 5	236	2.45	8.48	189	4.30	8.60	Dull day. Gale and heavy rain during night.
Mon. 6	246	2.73	8.56	187	4.50	8.78	Dull cold day. Very windy. Rain previous evening. Night cold (34° F.)
Tues. 7	281	3.50	8.60	179	3.90	8.60	Fine day. Over 10 hours sunshine. Northerly wind.
Wed. 8	245	2.62	8.70	193	4.50	8.64	Fine day. Slight rain at mid-day.
Thur. 9	282	2.70	8.66	183	3.67	8.50	Brightest day throughout the experiment. No. 11 in "season."
Friday 10	281	2.10	8.65	183	4.00	8.67	Fine hot day after warm night. No. 19 in "season."
Sat. 11	218	2.80	8.85	176	5.25	8.73	Dull showery day after warm night. Thunderstorm during night. P.M. milked earlier than usual.
Sun. 12	244	2.90	8.82	162	4.17	8.08	Morning dull, afternoon fine. Heavy thunderstorms during late afternoon and evening of 11th.
Mon. 13	231	2.02	8.66	169	3.90	8.72	Cooler during night. Cold day, with rain during afternoon.
Tues. 14	252	2.82	8.67	178	4.48	8.61	Very dull, close day, with showers.
Wed. 15	224	2.86	8.76	171	4.80	8.48	Rain continuous since 14th up to early morning; then fair but dull. Afternoon close.
Thur. 16	224	2.92	8.65	170	4.47	8.66	Dull and showery. Rain during night.
Friday 17	200	2.00	8.87	175	4.32	8.64	Morning fine. Thunder during afternoon, but no rain. Air close and oppressive. No. 18 in "season."
Sat. 18	208	2.90	8.88	162	4.02	8.73	Heavy rain during night. Dull cold day. Northerly wind.
Sun. 19	210	3.30	8.75	146	4.10	8.60	Dull cold day. No. 10 in "season."
Mon. 20	215	2.82	8.75	167	4.58	8.46	Fine warm day after dull cool morning.
Tues. 21	203	3.10	8.74	168	4.02	8.69	Morning fine and warm. Rain in afternoon. No. 5 in "season."
Wed. 22	207	3.20	8.78	168	4.18	8.70	Very heavy rain during night. Morning showery. Afternoon warm and bright. No. 17 in "season."
Thur. 23	201	3.00	8.71	163	4.45	8.78	Fine warm day.
Friday 24	218	3.08	8.69	150	4.05	8.78	Rain during night. Dull morning. Cows turned into fresh pasture this morning. No. 4 in "season."
Sat. 25	192	3.00	8.86	160	4.10	8.61	Fine hot day.
Sun. 26	206	3.20	8.89	149	4.48	8.71	Heavy rain during night and morning. Afternoon fine. Milk of No. 22 kept out of bulk.
Mon. 27	218	2.88	8.77	168	4.00	8.49	Cool day after cold night. Afternoon wet.
Tues. 28	227	3.00	8.78	160	4.52	8.54	Heavy rain during night. Fine day. No. 12 in "season."
Wed. 29	216	3.82	8.73	163	..	..	Milk of No. 22 kept out of bulk.
Thur. 30	224	2.90	8.55	166	4.38	8.70	Thunderstorm about 11 a.m. Afternoon fine.
Friday 31	208	2.92	8.60	154	4.20	8.88	Morning wet. Afternoon fine. No. 20 not milked (P.M.) owing to injury.
Mean results for whole period (52 days)	219.4	2.38	8.81	183.4	4.18	8.67	Fine warm day. No. 20 not milked at all owing to injury.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1903, AND METEOROLOGY OF THE YEAR RELATIVE THERETO.

THE CROPS.

THE following comparison of the cereal and other crops of 1903 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The meteorology of the year has been furnished by Dr Alex. Buchan, Secretary of the Meteorological Society of Scotland.

The queries issued by the Secretary were in the following terms:—

1. What was the quantity, per imperial acre, and quality of grain and straw, as compared with last year, of the following crops? The quantity of each crop to be stated in bushels. What quantity of seed is generally sown per acre?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time? and if so, how long?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively? The quantity to be stated in tons and cwts.
4. Was the meadow-hay crop more or less productive than last year?
5. What was the yield of the potato crop, per imperial acre, as compared with last year? The quantity to be stated in tons and cwts. Was there any disease? and if so, to what extent, and when did it commence? Were any new varieties planted, and with what result?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird? Was more than one sowing required? and why?
7. Were the crops injured by insects? State the kinds of insects. Was the damage greater or less than usual?
8. Were the crops injured by weeds? State the kinds of weeds. Was the damage greater or less than usual?
9. Were the pastures during the season of average growth and quality with last year?
10. How did stock thrive on them?

11. Have cattle and sheep been free from disease?
12. What was the quality of the clip of wool, and was it over or under the average?

From the answers received, the following notes and statistics have been compiled:—

EDINBURGSHIRE. *Wheat*.—40 bushels; superior quality to last year. Straw about the same; also better quality. $3\frac{1}{2}$ bushels sown.

Barley.—32 to 40 bushels; quality superior to last year; straw much lighter; 3 bushels seed sown. In exposed places much shaken with high winds end of August.

Oats.—40 to 48 bushels; quality much the same as last year; straw rather less; 4 bushels seed sown.

Harvest commenced about the same time as last year, but very protracted, lasting from six to eight weeks in plenty cases.

Hay.—Very light crop; 30 cwt. to 2 tons. Well got, and fine quality. Best weather of the season for making hay. At present prices 20s. to 25s. per ton more than last year. Second a very good crop, but very ill got. *Meadow-hay*.—A light crop, and not well got.

Potatoes.—About the same as last year; 7 to 10 tons. Disease in some varieties owing to wet weather. Most remunerative crop of the season, now selling at 30s. per ton more than last year, realising £30 to £40 per acre.

Turnips.—Very good crop; much the same as last year; improved very much of late; 20 to 30 tons. Braided well, and no second sowing. Not injured by fly. *Mangold*.—A better crop than last year; 20 to 25 tons.

No damage by insects or weeds.

Live Stock.—Pastures were very good. Stock throve well, and paid better. Grass on stubbles was very remunerative, lambs selling fat, and paying as much as 1s. 3d. a-week. Cattle and sheep quite free from disease. *Clip of wool*.—Better than last year, and higher prices.

LINLITHGOWSHIRE. *Wheat*.—36 bushels; deficient quality, both grain and straw; seed sown, 4 bushels.

Barley.—40 bushels; seed sown, 3 bushels.

Oats.—40 bushels; seed sown, 4 bushels.

Harvest began eight to ten days later.

Hay.—30 cwt.; quality not so good. *Meadow-hay*.—None.

Potatoes.—Less than last year; with disease very bad on some farms.

Turnips.—20 tons; fair quality crop; late in being sown; braided with first sowing. Would have been a heavy crop had September not been wretchedly wet.

Live Stock.—Pastures average growth, but quality deficient. Stock throve not so well. Cattle and sheep free from disease. *Clip of wool*.—Average.

HADDINGTONSHIRE (Upper District). *Wheat*.—None grown.

Barley.—38 bushels; not properly ripened, and discoloured by wet weather in harvest; $3\frac{1}{2}$ bushels sown.

Oats.—40 to 44 bushels; good quality where not damaged by rain in harvest; straw, large crop; 4 bushels sown.

Harvest three weeks later.

Hay.—2 tons; fairly well secured. *Meadow-hay*.—Lighter crop, and not so well harvested.

Potatoes.—5½ tons ; no disease. All old varieties.

Turnips.—About 20 tons ; one sowing, and good braird.

Little or no damage by insects this year. Some fields damaged by excess of wild mustard or "runches."

Live Stock.—Pastures, average. Stock thrive well ; no disease. *Clip of wool*.—(Good average clip.

HADDINGTONSHIRE (Lower District). *Wheat*.—36 to 44 bushels ; less straw than last year ; 3½ bushels sown.

Barley.—32 to 44 bushels ; poor crop in most cases as regards both quantity and quality ; smallest crop of straw we have had for years ; 2½ to 3 bushels sown.

Oats.—36 to 44 bushels ; small crop of straw, but of good quality ; 3½ to 5 bushels sown.

Harvest began about the same time as last year—the beginning of September.

Hay.—About 2 tons, or rather less than last year ; quality fairly good. First crop well got, second crop very much damaged. *Meadow-hay*—None grown.

Potatoes.—Early sorts a good crop, but about half diseased. Up-to-Dates and such varieties, 8 to 10 tons ; a good deal of disease in those grown on stiff land. Maincrops and Langworthies, 4 to 6 tons ; a disappointing crop ; a little disease.

Turnips.—15 to 25 tons of good quality ; much better feeding value than last year. Did not braird well on stiff land ; very little second sowing.

No damage by insects or weeds.

Live Stock.—Pastures were rather bare in the early summer, but improved later, and were very rough in the autumn on account of so much wet weather. Stock thrive fairly well ; to begin with, they were rather bare of grass, and later the weather was too cold and wet. *Clip of wool*—About an average.

BERWICKSHIRE (Merse). *Wheat*.—Average, 36 bushels ; quality average ; straw abundant ; seeding, 3½ bushels. Only grown in exceptionally favourable circumstances.

Barley.—Average, 35 bushels ; straw, good average. Early crops, when harvesting was not much interfered with by rain, are excellent quality, but light in yield ; later crops much damaged, and grain very inferior. Seeding, 3 bushels.

Oats.—Average, 40 bushels of good grain where early ; about one-half much damaged in harvesting. Straw abundant ; seeding, 4 bushels.

Harvest began about the same time as last year ; in many cases crops were cut imperfectly ripened. Harvest, except in a few early localities, was a protracted operation, lasting in many instances eight or nine weeks.

Hay.—Owing to heavy drought till middle of June, was a very light, thin crop ; average about 28 cwt. The aftermath was more luxuriant, but clovers weak. *Meadow-hay*—An inferior crop, and not secured very well.

Potatoes.—A fair crop, but in some parts much diseased ; tubers of fair size.

Turnips.—Brairded well, and where sown early have turned out a good crop up to 25 tons per acre ; but later, some fields have not a full weight of roots. Average about 20 tons all over. Finger-and-toe very prevalent.

No injury by insects. Weeds in turnips were very difficult to kill.

Live Stock.—In early part of season pastures were not luxuriant but of

good quality; later the quality was much deteriorated. Stocks have been healthy throughout the year, but left little profit to grazier. *Clip of wool*—The weight of fleece was about one-twelfth above the previous year, and was good quality, and sold at enhanced prices.

BERWICKSHIRE (Lammermoor). *Wheat*.—Very little grown.

Barley.—Only in very exceptional circumstances was it possible to secure barley in saleable condition; 24 to 32 bushels of light, weathered grain—straw long, but thin on the ground.

Oats.—35 bushels; three-quarters inferior, owing to disastrous harvesting conditions. In some late districts much of the crop was never fully ripened, and a considerable loss was sustained from shaking.

Harvest began about the third week of September, and in very few instances was it completed in October. Large quantities of crop were still outstanding in the second week of November.

Hay.—A very light crop all over, owing to excessive drought, which continued till July; average about 25 cwt. *Meadow-hay*.—A miserable crop; not half an average, and often materially damaged by bad weather.

Potatoes.—A most irregular crop; not much disease, but a want of full-sized tubers. Up-to-Date common variety.

Turnips.—Braird good, but only early fields a full crop; average, 18 tons. Finger-and-toe much in evidence everywhere.

No injury by insects. Weeds in turnips were very difficult to kill.

Live Stock.—Pastures almost unprecedentedly bare till July; later there was abundance of keep of fair quality, and stock did fairly well, and was free from disease. *Clip of wool*—The weight of fleece was about one-twelfth above the previous year, and was good quality, and sold at enhanced prices.

ROXBURGHSHIRE. *Wheat*.—Not much grown; quality of grain and straw poor, and most of it much damaged by weather. Seed about 3 bushels; yield from 20 to 30 bushels.

Barley.—Very irregularly ripened, and a great deal utterly ruined by the weather; most of the straw of little value. Seed about 3 bushels; yield from 20 to 40 bushels.

Oats.—Also very irregularly ripened, and much of the crop ruined by the weather; hence the straw very poor. Seed from 4 to 5 bushels; yield from 14 to 30 bushels.

Harvest later than last year, and owing to crops not ripening properly and the wet season, a large portion was standing out in November. It has been the most disastrous harvest in the memory of the present generation.

Hay.—Under the average, both quantity and quality. *Meadow-hay*.—Much damaged by wet weather, and of poor quality.

Potatoes.—Under the average; almost no disease. Maincrops and Up-to-Dates.

Turnips.—Quite impossible to say the bulk, as this is so very variable over the district. Land was so very dry at first that the seed germinated badly, and a great deal of resowing had to be done. In some parts of the district the crop is a total failure.

Almost no damage done by insects or weeds.

Live Stock.—Pastures did badly owing to adverse weather. Sheep and cattle did fairly well considering the season, and were very free from disease. *Clip of wool*—Of good quality, and above the average in quantity.

SELKIRKSHIRE. *Wheat*.—4 bushels per acre sown; quality inferior to last year; 28 bushels.

Barley.—28 bushels; sown 4 bushels; inferior quality.

Oats.—Quite impossible to give any quotation, the grain being so much sprouted, two-thirds of it being practically useless. Have farmed land on my own account for fifty years, but never saw the same before throughout Scotland. Practically, there were three harvests—the first fairly good; the second, bad beyond description; and the third, very late, but an improvement.

Harvest late; began 9th September, finished by 4th November; very late, expensive harvest; plenty crops would not pay for harvesting, so much sprouting.

Hay.—Average crop; well got first crop; second crop badly wasted; 2 tons 10 cwt. *Meadow-hay*.—Crop less productive than last year.

Potatoes.—A poor crop, and a good deal of disease; not the half of last year.

Turnips.—Very uneven braird, owing to drought; would say under average, as a rule.

No injury by insects or weeds.

Live Stock.—Pastures good, and stock thrive well. Cattle and sheep free from disease, except some outbreaks of anthrax. *Clip of wool*.—Over average.

PERBLESSHIRE. *Wheat*.—None grown.

Barley.—None grown.

Oats.—25 bushels; quality good; 5 bushels sown.

Harvest began at the usual time.

Hay.—2 tons; quality good; clover scarce. *Meadow-hay*.—Average crop.

Potatoes.—9 tons; no disease. No new varieties.

Turnips.—20 tons. Brairded well; one sowing only.

No injury by insects or weeds.

Live Stock.—Pastures average. Stock thrive well. Cattle and sheep free from disease. *Clip of wool*.—Average.

DUMFRIESSHIRE (Annandale). *Wheat*.—No wheat grown.

Barley.—Very little barley grown, and that little seriously damaged with exposure.

Oats.—Where harvested in time, would compare with last year; grain 38 bushels; straw $1\frac{1}{2}$ to $1\frac{3}{4}$ ton.

Harvest began about ten days after usual time.

Hay.—Less than last year. The greater breadth pastured in the spring months; where seeds were hained, weight $1\frac{1}{2}$ to $1\frac{3}{4}$ ton; where pastured, 18 to 20 cwt. Quality worse, owing to excessive wet. Very little clover.

Meadow-hay.—Less than last year.

Potatoes.—Less than last year; average, 6 tons. No disease. No new varieties planted.

Turnips.—Variable. Seed in most cases brairded badly owing to drought and fly. Where crop came away from first sowing, average weight 20 to 25 tons; where resowing took place, 12 to 15 tons.

Oats were injured by grub; turnips by turnip-fly. Wire-worm damage, more than usual. No damage by weeds.

Live Stock.—Pastures were of average growth, but quality very much worse than usual. Stock did badly. Cattle have generally been free from disease, but great complaints have been made about "red biary" amongst sheep during autumn months. *Clip of wool*.—Rather over average.

DUMFRIESSHIRE (Nithsdale). *Wheat*.—None.

Barley.—None.

Oats.—This crop did well through the growing season, and looked like

making a good return, but owing to the disastrous harvest it was almost completely lost on some farms. In the few cases properly got, the yield would be 35 bushels.

Harvest about two weeks later than usual.

Hay.—Less than last year; say $1\frac{1}{2}$ ton average; not well got generally. *Meadow-hay*—About the same bulk, but badly got.

Potatoes.—This crop was good; yield above the average, and quality surprising, considering the season.

Turnips.—Certainly a bad turnip year. They never seemed to come away properly all summer, and although there was a late growth, the crop was much below an average one.

The turnip-fly was troublesome when sown early, and much resowing had to be done. Weeds quite plentiful, and difficult to manage.

Live Stock.—A sunless, wet year made pastures soft and watery. On light land grass was plentiful. Stock did fairly well, and milk-cows better than expected. Cattle and sheep free from disease. *Clip of wool*—Fully an average.

DUMFRIESSHIRE (Eskdale). *Wheat*.—None grown in this district.

Barley.—Practically none grown.

Oats.—Nearly an average crop, but very irregularly ripened, owing to the wet, cold weather, with a nearly total absence of sun, rendering the harvest a good fortnight later than the previous year. Exceptionally few got earlier to work, and benefited by a week of fairly good drying weather, which was made the most of. After this probably the worst weather on record set in, in the majority of cases absolutely ruining and causing a great many to cart the crop direct to the midden-stead, being good for nothing else. Far from rare instances, the crop was not cut until well into December, and in some instances standing out in the fields until Christmas. A truly ruinous year for farmers.

Harvest began after the usual time—some about a fortnight, others many weeks later.

Hay.—As compared with last year, they were a little lighter, but fairly well got—i.e., the ryegrass and the earlier meadows; but the bulk of the later-got hay was spoiled, most of it utterly so—in fact, a considerable quantity amongst the hills was left in swathes. Aftermaths, owing to excessive rain and cold frosty nights, were comparatively worthless. *Meadow-hay*—Scarcely so productive.

Potatoes.—Wretchedly poor in this district, with a considerable amount of disease; yield probably would not average more than $3\frac{1}{2}$ tons. No new varieties planted.

Turnips.—Owing to excessive rainfall and cold frosty nights, turnips were not got well in, although they braided fairly well, but came very slowly to the hoe, and continued to make very slow progress throughout the summer; but few had to be sown over again. It would be difficult to estimate the average weight of the crop, so many being wretchedly bad—so much so, that a great part were stocked broadcast; but where liberally manured, on dry land they began bulbing about the end of September, and eventually grew into a fair crop—perhaps about 16 tons.

Crops quite free from insects. Greatly injured by weeds, principally chickweed, especially on damp land, the soil getting so saturated with rain that the grubbers only moved the weeds, and many had to give up working them in despair.

Live Stock.—Pastures were a full average growth, but of comparatively poor quality. Stock thrived better than expected, the cold and wet weather giving them immunity from the fly pests, which of course benefited them to a certain degree. Cattle and sheep more free than usual

Oats.—Quite impossible to give any quotation, the grain being so much sprouted, two-thirds of it being practically useless. Have farmed land on my own account for fifty years, but never saw the same before throughout Scotland. Practically, there were three harvests—the first fairly good; the second, bad beyond description; and the third, very late, but an improvement.

Harvest late; began 9th September, finished by 4th November; very late, expensive harvest; plenty crops would not pay for harvesting, so much sprouting.

Hay.—Average crop; well got first crop; second crop badly wasted; 2 tons 10 cwt. *Meadow-hay*—Crop less productive than last year.

Potatoes.—A poor crop, and a good deal of disease; not the half of last year.

Turnips.—Very uneven braird, owing to drought; would say under average, as a rule.

No injury by insects or weeds.

Live Stock.—Pastures good, and stock thrive well. Cattle and sheep free from disease, except some outbreaks of anthrax. *Clip of wool*—Over average.

PEEBLESSHIRE. *Wheat*.—None grown.

Barley.—None grown.

Oats.—25 bushels; quality good; 5 bushels sown.

Harvest began at the usual time.

Hay.—2 tons; quality good; clover scarce. *Meadow-hay*—Average crop.

Potatoes.—9 tons; no disease. No new varieties.

Turnips.—20 tons. Brairded well; one sowing only.

No injury by insects or weeds.

Live Stock.—Pastures average. Stock thrive well. Cattle and sheep free from disease. *Clip of wool*—Average.

DUMFRIESHIRE (Annandale). *Wheat*.—No wheat grown.

Barley.—Very little barley grown, and that little seriously damaged with exposure.

Oats.—Where harvested in time, would compare with last year; grain 38 bushels; straw $1\frac{1}{2}$ to $1\frac{1}{4}$ ton.

Harvest began about ten days after usual time.

Hay.—Less than last year. The greater breadth pastured in the spring months; where seeds were hained, weight $1\frac{1}{2}$ to $1\frac{1}{4}$ ton; where pastured, 18 to 20 cwt. Quality worse, owing to excessive wet. Very little clover.

Meadow-hay.—Less than last year.

Potatoes.—Less than last year; average, 6 tons. No disease. No new varieties planted.

Turnips.—Variable. Seed in most cases brairded badly owing to drought and fly. Where crop came away from first sowing, average weight 20 to 25 tons; where resowing took place, 12 to 15 tons.

Oats were injured by grub; turnips by turnip-fly. Wire-worm damage, more than usual. No damage by weeds.

Live Stock.—Pastures were of average growth, but quality very much worse than usual. Stock did badly. Cattle have generally been free from disease, but great complaints have been made about "red biary" amongst sheep during autumn months. *Clip of wool*—Rather over average.

DUMFRIESHIRE (Nithsdale). *Wheat*.—None.

Barley.—None.

Oats.—This crop did well through the growing season, and looked like

making a good return, but owing to the disastrous harvest it was almost completely lost on some farms. In the few cases properly got, the yield would be 35 bushels.

Harvest about two weeks later than usual.

Hay.—Less than last year; say $1\frac{1}{2}$ ton average; not well got generally. *Meadow-hay*.—About the same bulk, but badly got.

Potatoes.—This crop was good; yield above the average, and quality surprising, considering the season.

Turnips.—Certainly a bad turnip year. They never seemed to come away properly all summer, and although there was a late growth, the crop was much below an average one.

The turnip-fly was troublesome when sown early, and much resowing had to be done. Weeds quite plentiful, and difficult to manage.

Live Stock.—A sunless, wet year made pastures soft and watery. On light land grass was plentiful. Stock did fairly well, and milk-cows better than expected. Cattle and sheep free from disease. *Clip of wool*.—Fully an average.

DUMFRIESSHIRE (Eskdale). *Wheat*.—None grown in this district.

Barley.—Practically none grown.

Oats.—Nearly an average crop, but very irregularly ripened, owing to the wet, cold weather, with a nearly total absence of sun, rendering the harvest a good fortnight later than the previous year. Exceptionally few got earlier to work, and benefited by a week of fairly good drying weather, which was made the most of. After this probably the worst weather on record set in, in the majority of cases absolutely ruining and causing a great many to cart the crop direct to the midden-stead, being good for nothing else. Far from rare instances, the crop was not cut until well into December, and in some instances standing out in the fields until Christmas. A truly ruinous year for farmers.

Harvest began after the usual time—some about a fortnight, others many weeks later.

Hay.—As compared with last year, they were a little lighter, but fairly well got—i.e., the ryegrass and the earlier meadows; but the bulk of the later-got hay was spoiled, most of it utterly so—in fact, a considerable quantity amongst the hills was left in swathes. Aftermaths, owing to excessive rain and cold frosty nights, were comparatively worthless. *Meadow-hay*.—Scarcely so productive.

Potatoes.—Wretchedly poor in this district, with a considerable amount of disease; yield probably would not average more than $3\frac{1}{2}$ tons. No new varieties planted.

Turnips.—Owing to excessive rainfall and cold frosty nights, turnips were not got well in, although they braided fairly well, but came very slowly to the hoe, and continued to make very slow progress throughout the summer; but few had to be sown over again. It would be difficult to estimate the average weight of the crop, so many being wretchedly bad—so much so, that a great part were stocked broadcast; but where liberally manured, on dry land they began bulbing about the end of September, and eventually grew into a fair crop—perhaps about 16 tons.

Crops quite free from insects. Greatly injured by weeds, principally chickweed, especially on damp land, the soil getting so saturated with rain that the grubbers only moved the weeds, and many had to give up working them in despair.

Live Stock.—Pastures were a full average growth, but of comparatively poor quality. Stock thrived better than expected, the cold and wet weather giving them immunity from the fly pests, which of course benefited them to a certain degree. Cattle and sheep more free than usual

from disease, and they also were comparatively free from the maggot-fly, which have troubled them dreadfully for a few years back. *Clip of wool*—Good in quality, and also heavier.

KIRKCUDBRIGHTSHIRE. *Wheat*.—28 bushels; quality under average; straw fairly abundant; seed $2\frac{1}{2}$ to 3 bushels.

Barley.—34 bushels; quality under average; straw under average; seed about 3 to $3\frac{1}{2}$ bushels.

Oats.—35 bushels; quality irregular—some average, some much under average; straw about average in quantity; seed, 4 to 5 bushels.

Harvest began about two weeks later than usual.

Hay.—Under average; quality moderate; yield about 25 cwt.

Meadow-hay.—About equal to last year.

Potatoes.—Irregular; some crops heavy, others moderate; generally over average—7 tons. Some varieties considerably diseased, some quite sound. Some new varieties planted; good results.

Turnips.—Irregular; some crops good on best land, very poor on secondary land; general average less than a fair crop—12 to 18 tons, some 25 tons. Braided well; little or no resowing.

Crops not seriously injured by insects. Weeds much worse than usual. The usual annual weeds could not be kept down owing to wet weather.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock thrived fairly well. Cattle and sheep free from disease. *Clip of wool*.—Average in yield and quality.

WIGTOWNSHIRE. *Wheat*.—29 bushels; quality fair; grain and straw sound, but grain light in quality owing to damp and wet weather throughout the season, particularly in and after harvest.

Barley.—30 bushels; but owing to wet season grain $1\frac{1}{2}$ lb. per bushel under average, but sound, and fairly well secured in harvest.

Oats.—32 bushels; but weight considerably under average of years. Lea braird very much cut by grub; a considerable area sown over, making harvesting late. A considerable portion of the crop very inferior in quality, and not marketable.

Harvest eight to ten days later than in former years.

Hay.—30 cwt., being under average both in quantity and quality.

Meadow-hay.—Less productive, and much injured from continuance of wet weather.

Potatoes.—5 tons; much the same as in former years, but more small and diseased tubers than usual.

Turnips.—16 tons. Crop braided fairly, but where land was wet the crop suffered very much.

No damage by insects, but rats have become a serious scourge. More natural weeds in turnip crop than usual owing to wet weather and no sunshine to kill them.

Live Stock.—Pastures not so good as usual owing to so much wet and want of sunshine. Stock thrived not so well as in former years owing to so much rain and want of heat. *Clip of wool*.—About average.

AYRSHIRE. *Wheat*.—None grown.

Barley.—40 bushels; fair quality, mostly well got; seed, 3 bushels.

Oats.—45 bushels; produce very variable. That secured during two good weeks in middle of September is of fine quality—grain and straw, and anything later ranges down to stuff absolutely valueless.

Harvest began ten days later than usual; completed 28th December.

Hay.—1 ton 10 cwt.; a light crop, owing to backward, cold spring.

Potatoes.—From 8 to 9 tons; fully an average. No disease. Nothing specially new in earlies.

Turnips.—12 to 14 tons ; about half a crop. Fair braird. Finger-and-toe unusually prevalent.

Wire-worm unusually prevalent in corn crops, and much resowing had to be done, causing late harvesting in such cases. Owing to wet season it was impossible to get the upper hand of annual and other weeds, and this will be more apparent in future seasons.

Live Stock.—Pastures of average growth on light land in early season ; heavy land, poor grass and short season. Stock throve fairly well during summer, but in autumn did no good. Cattle and sheep free from disease. *Clip of wool*—5 to 6 lb. on arable lands ; about average.

BUTE. *Wheat*.—None grown this season.

Barley.—3½ bushels sown ; well got ; average for straw and grain ; yield, 36 bushels.

Oats.—5 bushels sown ; mostly well got, except some late farms ; average for straw and oats.

Harvest begun 1st September, a week later than usual.

Hay.—The worst crop for many years ; about 1 ton ; some well got, others very bad. *Meadow-hay*.—Not much grown ; very small crop, and badly got.

Potatoes.—Early, where started in boxes, a good crop ; about 6 tons. Late ones not so good ; about 5 tons.

Turnips.—The worst crop I have seen in Bute ; not half an average ; about 10 tons. Brairded well, but very bad with finger-and-toe.

No injury by insects. Crops injured by soft weeds, which usually grow in a wet season.

Live Stock.—Pastures much under an average. Stock had to get extra feeding on the grass. Cattle and sheep free from disease. *Clip of wool*.—Under an average.

ARRAN. *Wheat*.—None grown.

Barley.—None grown.

Oats.—A very fair crop as to bulk, lea oats being badly grubbed and very late ; sown out land, fair crop ; yield, say, 30 bushels ; quality poor, and much damaged by the wet season.

Harvest began later than usual—say eight days ; finished about 10th November in the hill districts.

Hay.—About 20 cwt. ; quality not so good as last year. *Meadow-hay*.—Less than usual ; little grown.

Potatoes.—Say 4 tons ; small in size. A good deal of disease ; begun early. No new varieties grown. Early varieties dug in June and July ; average crop.

Turnips.—Say 10 tons ; very poor on damp soil ; not much bigger than potatoes in some districts ; a little finger-and-toe.

Not many insects this year ; more weeds than usual.

Live Stock.—Pastures below the average. Stock did not thrive as well as last year. Cattle and sheep free from disease. *Clip of wool*.—About an average quality ; prices a little better.

LANARKSHIRE (Upper Ward). *Wheat*.—None grown.

Barley.—None grown.

Oats.—About 30 bushels ; a similar quantity to last year, but very deficient in quality and light of weight, the grain being insufficiently ripened owing to the want of sun ; seed sown, 5 to 6 bushels.

Harvest began about the middle of September, a fortnight later than usual ; and it will long be remembered as one of the worst and dreariest harvests on record, which was prolonged in many instances till November in consequence of continued wet weather.

Hay.—A very moderate crop ; $1\frac{1}{2}$ to 2 tons ; well secured. Aftermath very little. *Meadow-hay*.—A fair crop, though rather less than last year, and but indifferently secured.

Potatoes.—A good crop ; better than last year, both as regards quantity and quality ; from 6 to 10 tons. Very little disease, but in many instances the growth of the crop was checked by frost. No new varieties planted to any extent—Sutton's, Up-to-Dates, and British Queens being the principal varieties.

Turnips.—25 to 30 tons ; about the same as last year ; quality good. Brairded well ; little or no resowing.

Little or no damage by insects ; some damage by finger-and-toe on some farms. Weeds of a surface character, and easily dealt with.

Live Stock.—Pastures late in coming, but good, especially in the end of the season. Stock thrive fairly. Cattle and sheep free from disease. *Clip of wool*.—Quantity and quality average.

LANARKSHIRE (Middle Ward). *Wheat*.—From 35 to 40 bushels ; quality of grain inferior ; straw very good—rather less than last year. Crop greatly spoiled through wet harvest ; about $3\frac{1}{2}$ bushels sown.

Barley.—Hardly any grown.

Oats.—35 to 40 bushels ; grain fair. Less straw than last year, but this crop was nearly all spoiled through standing out during weeks of incessant rain. Under usual weather conditions, would have been a fair average crop.

Harvest began about same time, but unusually prolonged through wet weather.

Hay.—Less than last year ; ryegrass $1\frac{1}{2}$ ton, timothy 2 tons. Weather good for making, and well secured. *Meadow-hay*.—Average, and well got.

Potatoes.—About same as last year ; 9 tons. No new varieties planted. A good deal of disease in earlier varieties, and also some in later.

Turnips.—Unsatisfactory crop ; some districts almost a blank. Brairded unevenly ; some second sowing. Half a crop, and very small.

No damage by insects. Crops not injured by weeds.

Live Stock.—Pastures good ; stock thrive well, and free from disease. *Clip of wool*.—Average.

LANARKSHIRE (Lower Ward). *Wheat*.—Owing to the wet winter and spring, wheat in general in this quarter was thin ; not so bulky as last year ; 38 to 42 bushels ; 4 bushels seed sown.

Barley.—None grown.

Oats.—Not nearly so bulky in straw, but of better quality where it was got in in good order, but about one-third of it spoiled with weather ; about 40 bushels ; 5 bushels seed sown.

Harvest a little earlier than last year, but a long tedious one ; the worst that has been here for a long time.

Hay.—Ryegrass about one-third less than last year— $1\frac{1}{2}$ ton ; but timothy was very good—about 3 tons. *Meadow-hay*.—Little grown.

Potatoes.—Were a fair crop, but a good few diseased owing to the ground being so wet ; about 7 tons. A few new kinds planted.

Turnips.—Grew well at the back-end, and better than last year ; mostly all sound ; about 25 tons.

No damage by insects or weeds.

Live Stock.—Pastures fair, but hurt with cold frosty nights and wet ground. Stock did only fair. Cattle and sheep free from disease.

RENFREWSHIRE. *Wheat*.—None grown in immediate neighbourhood.

Barley.—None grown.

Oats.—58 bushels ; the quality of both grain and straw not so good as compared with last year ; 4 bushels sown.

Harvest about a fortnight after the usual time.

Hay.—The quantity much the same as last year, but the quality not so good, and owing to wet season very little first-class hay got in county.

Meadow-hay.—None.

Potatoes.—Crop much the same as last year ; no disease. (Quality not so good, on account of wet weather.

Turnips.—Season far too wet for maturing turnips ; no second sowing resorted to ; weight, say, average 15 tons.

ARGYLLSHIRE (District of Lochgilphead). *Wheat*.—None grown.

Barley.—None grown.

Oats.—Yield about 36 bushels ; 6 bushels of seed sown.

Harvest began on 7th September, about three weeks later than the usual time.

Hay.—Ryegrass and clover lighter than last year ; about 1 ton 10 cwt. ; quality only fair. *Meadow-hay*.—Less by about one-third.

Potatoes.—Yield not so good as last year ; about 6 tons. Disease very bad in the early varieties—viz., Jeannie Deans and Sutton's Abundance—which started about the end of August.

Turnips.—Better than last year ; about 25 tons. Crop braided well ; no second sowing required.

No injury by insects or weeds.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock thrived very well. Cattle and sheep free from disease. *Clip of wool*.—Quality good ; about average clip.

ARGYLLSHIRE (Kintyre). *Wheat*.—None grown.

Bere is the variety chiefly sown in this district. The crop was an average one, both in grain and straw ; about 50 bushels grain and 40 cwt. straw. Crop secured in good condition. Grain 1½ lb. less per bushel than last year ; quantity of seed sown, 3½ to 4 bushels.

Oats.—After green crop, an average crop ; after lea, the crop was very much damaged by grub-worm in spring on the majority of farms. Very much below last year, both in grain and straw. Harvested in very bad weather, and stood a long time in the stook ; a great deal of it badly damaged. Seed sown, 5 to 6 bushels.

Harvest about two weeks later than last year ; very much prolonged, being the latest and wettest on record.

Hay.—A fair average crop, secured in good condition ; about 2 tons ; mostly ryegrass. Clover thinner than usual ; fairly well got. *Meadow-hay*.—About an average, but not so well secured.

Potatoes.—Early crop, about 2 tons more than last year. Late potatoes, poor crop ; 2 tons less than last year. A good deal of disease commenced about middle of September. No new varieties.

Turnips.—On good land fairly good ; 5 tons less than last year. On cold land total failure ; no resowing, but acres never thinned owing to the cold wet summer.

Weeds no worse than usual ; too cold for them to grow.

Live Stock.—Pastures not nearly so good as last year ; in most cases very bad. Stock thrived not so well as last year, unless where liberally fed with cake. Cattle and sheep free from disease. *Clip of wool*.—Good, and considerably over average.

ARGYLLSHIRE (Islands of Islay, Jura, and Colonsay). *Wheat*.—None grown.

Barley.—None grown.

Oats.—Straw similar to last year, but grain much lighter.

Harvest began about a fortnight later than usual.

Hay.—Quantity considerably less than usual ; an average of about half a ton less than last year. *Meadow-hay*.—Much the same as last year.

Potatoes.—As a whole, was rather heavier than last year, and there was less disease. Quality of potatoes, however, not so good, and in some cases the crop was a failure.

Turnips.—Where sown early, and well up before the drought in June, the crop is equal to last year. Late-sown turnips did not braird well, and had to be resown. As a whole, the crop is much less than last year, owing to blanks in many fields.

Crops not seriously injured by insects. Common weeds were luxuriant.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock throve well. Cattle and sheep fairly free from disease. *Clip of wool*.—About an average.

DUMBARTONSHIRE. *Wheat*.—About 30 bushels ; quality of grain not so good as last year, owing to want of sun and too much rain.

Barley.—Almost none grown.

Oats.—In the earliest fields, from 50 bushels on the best land to 24 bushels on the higher lands. The later fields can hardly be calculated, as so much was spoiled. Some still in stook on 1st January 1904.

Harvest from ten days to four weeks later than usual, owing to want of sun-heat.

Hay.—From 1 ton 15 cwt. to 1 ton 5 cwt. ; quality not so good as last year. *Meadow-hay*.—About the same quantity, but very bad quality owing to wet season ; some totally lost.

Potatoes.—Early crop, 7 tons ; late crop, 5 to 5½ tons. Some disease ; some varieties worse than others. Langworthies and Maincrops clearest of disease. No report of new varieties.

Turnips.—From 5 to 20 tons ; not much second sowing.

In some districts oats very much damaged by grub ; fly also bad on turnips. Weeds in turnip-fields difficult to manage owing to wet weather ; worse than usual.

Live Stock.—Pastures much the same as last year. Stock throve fairly well. Cattle and sheep generally free of disease, but a good deal of braxy in sheep. *Clip of wool*.—Quality good ; quantity above average.

STIRLINGSHIRE (Western District). *Wheat*.—Not sown in this district.

Barley.—No returns.

Oats.—Average crop ; more than half the crop lost.

Harvest began about usual time, which, owing to the long-continued wet, lasted well into November.

Hay.—Very short crop ryegrass ; scarcely any clover ; about 22 cwt. *Meadow-hay*.—Good crop, but more than half lost with wet weather and floods.

Potatoes.—Very fair crop ; 7 to 12 tons. Disease in earlier sorts ; commenced about end of September. No new varieties planted.

Turnips.—Early sown braird well, but suffered from drought later ; in majority of cases had to be resown. Very bad crop generally. Fields covered with weeds ; could not be cleaned on account of wet weather. Very hard to find average weight of crop ; should say from 5 to 25 tons.

Very little turnip-fly ; oats were badly wormed in parts. Crops much damaged by usual weeds ; damage greater than usual.

Live Stock.—Pastures were bare to begin with, but improved as the season advanced. Stock did fairly well. Cattle and sheep free from disease. *Clip of wool*.—Fine quality ; quantity about last year's.

STIRLINGSHIRE (Eastern District). *Wheat*.—Crop deficient, 4 qrs.; the worst grain and straw I ever saw; 4 bushels seed sown.

Barley.—Middling crop; poor straw; grain wasted with rain; 4 bushels sown.

Oats.—6 bushels seed sown; grain very bad, and straw useless for fodder.

Harvest late, and just newly finished (22nd December 1903).

Hay.—30 cwt.; not so good as last. *Meadow-hay*.—Good crop, but not well secured.

Potatoes.—Fair crop; 6 tons. Not so much disease; confined to a few varieties.

Turnips.—15 tons; did not grow well.

Very wet season; bad for cleaning land.

Live Stock.—Pastures very poor. Cattle did not thrive well; sheep did better. Both free from disease. *Clip of wool*.—Poor; under an average; but prices have improved a little.

CLACKMANNANSHIRE. *Wheat*.—The yield will be about 40 bushels where the land is well drained and dry; in wet land the yield is much less; straw under the average in bulk and quality; $3\frac{1}{2}$ bushels sown.

Barley.—A small crop; from 30 to 35 bushels; straw and grain damaged with the bad harvest; $3\frac{1}{2}$ to 4 bushels sown.

Oats.—Yield from 35 to 40 bushels where secured in fair order, but where the crop was long exposed after being cut the yield will be much less; the straw and grain very much damaged with wet weather after being cut; from 4 to 5 bushels sown.

The *harvest* was from a fortnight to three weeks later than the average time to commence, which was about the same time as last year. It has been one of the worst harvests on record, wheat being the only crop which was secured in fair condition, all the other crops being very much damaged; they were stacked in bad order, and have not dried well in the stacks.

Hay.—The crop is less than last year, and under the average; it was mostly secured in bad condition, the hay harvest being a long one. *Meadow-hay*.—A poor crop; under the average, and not very well got.

Potatoes.—An excellent crop on very dry land, and not much disease; but on wet land the crop is nearly a failure, and mostly diseased. The wet weather and want of sunshine told very much against potatoes planted in wet land.

Turnips.—The crop varies a good deal: on dry land the yield will be about 20 tons, on wet fields the crop is nearly a failure. Turnips braided badly, the seed being long in the ground before appearing. There was scarcely any second sowing.

Not much injury done by insects. Weeds all over were worse than usual. Where there was a failure of crop the ground got covered with weeds, and owing to wet weather the ground could not be cleaned.

Live Stock.—There was a plentiful supply of grass, but softer and poorer in quality than usual. Stock did not thrive so well on the grass; they had scarcely a dry bed the whole season. Cattle and sheep free from disease. *Clip of wool*.—An average one, with better prices.

FIFESHIRE (Middle and Eastern). *Wheat*.—The return will be from 32 to 36 bushels, the quality of both grain and straw being inferior to last year; while samples of the grain vary considerably, according to the weather conditions under which the crops were secured. Quantities of seed—drilled, 3 to $3\frac{1}{2}$ bushels; broadcast, 4 bushels.

Barley.—This crop in many districts was much damaged by the excessive rains experienced in October, and although there was not much

sprouting, still the grain was bleached and discoloured, and the quality of the straw inferior to average years. The yield is not so good as last year, but should return 40 to 44 bushels. Quantity of seed—drilled, 3 bushels; broadcast, 4 bushels.

Oats.—Gave a good return of grain—48 to 50 bushels; but the straw was much spoiled for fodder, while the large bulk of the grain was sprouted and blackened, and only fit for feeding purposes. Quantity of seed—drilled, 4 bushels; broadcast, 5 bushels.

Harvest began about three weeks later than last year, and was a very protracted and expensive one.

Hay.—The weather at hay-making time was very unsettled, and the crop a very light and in most districts inferior one, averaging about 1 ton. *Meadow-hay*.—Was less productive than last year, but not much grown in this district.

Potatoes.—This crop was an average one, yielding about 5 to 6 tons dressed potatoes, according to varieties grown; a good deal of disease appeared amongst the earlier varieties. A good many new varieties were planted—viz., Evergood, Royal Kidney, British Queen, &c.

Turnips.—A very irregular crop this season; from 10 to 12 tons. No resowing required, as much of the seed did not braid for a long time owing to the dry weather. A cold wet summer retarded the growth of the turnips, which, however, much improved with the open weather of November.

Almost no injury by insects to the turnip crop, but the cabbage plants suffered from the maggot, which caused a good many blanks amongst them. On account of the wet season weeds were very prevalent, some crops being injured by charlock, and a great quantity of chickweed appeared amongst the potato and turnip drills.

Live Stock.—Pastures were poor and considerably under the average, and cattle did not do so well as usual on them. Stock thrived unsatisfactorily. Cattle and sheep have kept free of disease, and healthy. *Clip of wool*.—An average.

FIFESHIRE (Western District). *Wheat*.—Was generally disappointing, and will not yield, well, say, 40 bushels as a maximum down to 32; say 1½ ton of straw, and of fair quality; 4 bushels sown of seed.

Barley.—Except on the very earliest farms, and these are few, the barley crop is all damaged and the grain most inferior, some of it being only fit for feeding, and the money return per acre will be the poorest on record. The straw is also much damaged, and is only fit for litter. It is impossible yet to estimate the yield, but it is certain to be very poor. Usually 3½ bushels of seed is sown.

Oats.—The greater part of this crop is also damaged, and the straw is most inferior; little of it will be good fodder. The yield of grain, however, such as it is, is fairly good. 4 to 5 bushels of seed sown.

Harvest began on the early farms about the 7th September, and in the later districts a week later, and dragged on to the middle of November, and even later, before it was completed; and, generally speaking, it took double the time of most harvests.

Hay.—A light, poor crop, with a great want of clover, and some of it very badly got. Many crops would not average over 10 cwt., while the maximum would not exceed 30 cwt. *Meadow-hay*.—A fair crop.

Potatoes.—On good dry soils the crop is a full average, but on inferior land, or strong or wet soils, the crop is most inferior and the tubers small, whilst in some cases the crop on such lands was almost a failure. A good deal of disease in all the varieties, the softer ones, such as Dates, Mains, and Farmer's Glories, more especially.

Turnips.—On warm, well-farmed, dry soils the crop is nearly an aver-

age, but on inferior or wet lands the crop is very poor, the bulbs small, and often much diseased. The better crops, however, have improved much during the last month. The crop braided well, and little resowing was required; but the plants grew little after being thinned, and indeed for long after.

The oat crop suffered much from wireworm and grub, and many fields were terribly thinned out and never recovered. Wheat was also thin on the ground. On free soils the turnip crop suffered much from chickweed, and from the continual rains and want of sunshine this weed could not be killed.

Live Stock.—There was plenty of grass, but of poor quality; too much wet, and no heat. Stock thrived fairly well when the pastures had shelter. Cattle and sheep perfectly free from disease. *Clip of wool*—Average, or good quality.

This is the worst season the present generation of farmers ever experienced. All crops poor, and generally the grain crop almost unsaleable, except at ruinous prices.

PERTSHIRE (Western District). *Wheat*.—A good average yield of 34 to 40 bushels; quite an average yield of straw of good quality, which was mostly secured before the wet weather set in; seed sown, $3\frac{1}{2}$ bushels. The area of wheat grown was fully larger than that of the previous year.

Barley.—On dry-field land the yield would be 32 bushels, and on carse land about 34 bushels; seed, 3 bushels. There would be an average yield of straw, but it was hopelessly ruined by the long spell of wet weather.

Oats.—The yield of grain would be a full average of 36 to 40 bushels; seed, 4 to 5 bushels; straw was an average yield, but the greater part of it was scarcely fit for bedding.

Harvest started about ten days later than in 1902, and for about a fortnight the weather was excellent. Then a spell of most extraordinary wet weather set in, which lasted for eight or ten weeks. In some cases harvest operations were being conducted as late as the first week in December.

Hay.—Under an average crop. In many cases badly got, and not of good quality. On carse land, $1\frac{1}{2}$ ton; on dry-field, $1\frac{1}{2}$ ton. *Meadow-hay*.—An average crop, but quality suffered on account of wet weather at time of hay-making.

Potatoes.—In most cases more than an average crop; $6\frac{1}{2}$ tons. Disease pretty prevalent, especially so after the crop had been lifted a few weeks. Old favourite varieties are chiefly planted, but Evergoods were planted on a few farms.

Turnips.—Very much under an average crop, but yellows generally were fully a better crop than swedes; 15 to 20 tons. Crop sound; a good braid, no turnip-fly, and no second sowing. A sunless summer, and little genial growing weather.

Weeds were a full average, and gave great trouble in dealing with them, it being in many cases impossible to give the green crop any horse-labour.

Live Stock.—Pastures were fairly good, but cattle did badly on them, and in most cases left nothing for grazing. Cattle and sheep free from disease. *Clip of wool*—About an average; quality fair.

PERTSHIRE (Eastern District). *Wheat*.—Fair crop; rather thin on the ground; not so bulky as last year; greatly damaged by wet weather; average yield, 28 to 32 bushels. Square Head did best; new varieties, such as Red King and New Era, did very badly, and are unsaleable for seed. Seed, 3 to 4 bushels.

Barley.—Good crop, but most of it badly secured; straw bulky; yield, 32 to 36 bushels. Chevalier, Common, and Egyptian have proved best varieties for this district. Seed, 3 to 4 bushels.

Oats.—Lea, very heavy crop; oats after turnips very thin and poor. Yield, former, 50 to 70 bushels; latter, 32 to 40 bushels. Seed, 3 to 6 bushels, according to variety. The Potato oat by far the best variety; thick-skinned oats, such as Storm King, Waverley, and Newmarket, almost unsaleable.

Harvest began late—about 7th September—and very protracted on account of the miserable weather.

Hay.—Very poor crop, and mostly secured in inferior condition. Yield from 20 to 30 cwt. Clover deficient. *Meadow-hay*.—Very little grown.

Potatoes.—Where planted early on light, dry land the crop turned out better than expected; from 5 to 7 tons, and wonderfully free from disease. On heavy or wet land, crop was poor, and a good deal diseased. Up-to-Date is the only old variety now worth growing. Several new varieties, such as Evergood, Royal Kidney, Northern Star, Sir John Llewellyn, King Edward VII., &c., have been tried in a small way, and are likely to be planted largely next season.

Turnips.—From half to two-thirds of last year's crop; roots small, blanky, and a good deal diseased; average yield, 15 to 18 tons. Seed braided badly for want of rain; then too much rain came. Plants got soured, and smothered with weeds.

Grub and wireworm in the grain crops did considerable damage. Weeds much worse than usual; the wet weather favoured them, and prevented them being killed by hoeing. Charlock in the grain crops, and twitch and annual weeds in the green-crops, did most damage.

Live Stock.—Pastures rather worse than last year, and not good quality. Stock thrive middling. They required a good allowance of cake and corn to do well. Cattle and sheep free from disease. Foot-rot in sheep rather more prevalent than usual. *Clip of wool*.—About average.

PERTSHIRE (Central District). *Wheat*.—Very little grown; would not thresh more than 30 bushels on the average. Practically none of it harvested to be of much value; straw much damaged. About 3½ bushels sown.

Barley.—Would thresh about 35 to 40 bushels, but practically none of it secured to be of much value except for feeding purposes. Straw also very much damaged, and secured in bad condition. About 4 bushels sown.

Oats.—Would thresh from 40 to 50 bushels, but very little of it secured to be of more than half value, and a great deal of it of very little value at all. Straw also very much damaged and wasted. 5 to 6 bushels sown.

Harvest very late, and the worst within the memory of most men. In almost all cases it was well into November before it was secured, and then it was in many cases of little value. On high-lying farms, where it was not cut till well on in October, it was secured in better order.

Hay.—Not such a heavy crop as the previous year. The average would be about 1 ton 5 cwt. for ryegrass and clover hay; crop well secured.

Meadow-hay.—Was a disappointing crop as to quantity and quality, and in most cases was difficult to secure.

Potatoes.—Were a fair average crop; about 6 to 8 tons dressed. Little disease, except in wet low-lying places.

Turnips.—Were very patchy throughout the district, but on the whole were a fair crop; it would be from 10 to 15 tons. Crop braided well in most cases, but required some second sowing in others.

Little or no damage by insects. There was more dirty land in the country this year, due to the smaller weeds, but the larger weeds, as thistles, &c., seemed fewer.

Live Stock.—Grass grew well all through the year. Stock did pretty well, but the wet weather, especially at the end of the grazing season, told on them considerably. Cattle and sheep free from disease. *Clip of wool*.—Quality good, and about an average. Maggots were not so bad this last season.

PERTSHIRE (Highland District). *Wheat*.—None grown.

Barley.—About 26 bushels. Very much damaged by bad weather; the greater part of it only fit for feeding purposes.

Oats.—After lea, 30 bushels. This crop nearly an average, but owing to so much rain shed freely both in cutting and stacking; a third of the crop spoiled by sprouting, and straw considerably damaged. Oats after green crop very much under an average—20 bushels—and so damaged that the whole is only fit for feeding purposes; the straw in many cases half-rotten. It is considered one-half of this crop is lost. 5 bushels sown.

Harvest commenced a month later than usual, and lasted fully seven weeks. It has been the worst in the recollection of any person living. The wet weather was so continuous that nothing could be done but keeping the stocks well up, and when opportunity occurred, getting it round bosses in small quantities.

Meadow-hay.—A very good crop; about an average, but in many instances not well secured.

Potatoes.—About 4½ tons; scarcely so heavy as last year. Not much disease. No new varieties planted.

Turnips.—Average about 16 tons; not so heavy as last year. Quality good. Braird good; no second sowing.

No damage from insects. No injury by weeds.

Live Stock.—Pastures under an average, especially on high land. Stock did not do well in the early part of the season, and never recovered their average condition. Cattle and sheep very free from disease. *Clip of wool*.—About an average, and good quality.

FORFARSHIRE (Western District). *Wheat*.—36 bushels; quality very inferior, unless on occasional farms, where it was got in fairly good. 4 bushels when sown by hand; about 3 when drilled.

Barley.—42 bushels; most of it very badly got, and, unless in a few exceptional cases, the quality of both straw and grain is the worst for years.

Oats.—Oats are yielding well, and I should say that 56 bushels would be common, and in some cases a good deal more, while there might be some less. I think half the crop would be fairly well got; the other half would just be very bad, as a lot of sheaves were green in the stook.

Harvest was very late, commencing here on the 8th of September.

Hay.—The average would be about 30 cwt. of ryegrass and clover, it being very thin on the ground; about a half of the crop would be fairly well got, and the other half very much damaged. *Meadow-hay* would be an average crop, but scarcely any grown in this part of the county.

Potatoes.—Would not be as good as last year; I should say 2 tons less. Disease commenced among the earlier sorts about September. I do not think that there has been much to speak of, unless in a few instances.

Turnips.—This crop, I am sorry to say, is a poor one all over, although there are some farms where the crop is as good as ever they had them; they can be found all the way from 3 tons to 30 tons.

It was too wet and cold for insects to have a good time of it. Crops of the turnip nature were, as a rule, where the land was light or mossy, nearly grown over with weeds. I think they are worse than usual.

Live Stock.—Pastures were not so bad for growth, but quality very

inferior owing to too much rain and cold nights. Stock did not thrive so well as in some former years, as the weather was too cold and wet. Cattle and sheep were, comparatively speaking, free from disease. *Clip of wool*—Would be rather over than under an average clip, with good quality.

FORFARSHIRE (Eastern District). *Wheat*.—42 to 44 bushels of fair quality; straw good. Owing to disastrous weather, secured in very bad order; sprouting quite general. 4 bushels sown.

Barley.—Heavy crop of both straw and grain; 46 to 52 bushels; both straw and grain ruined with bad harvest; 4 bushels sown.

Oats.—Good up-standing crop; 50 to 52 bushels; 4 to 6 bushels sown. Same remarks as to securing crop as above. Sprouting much worse than barley and wheat.

Harvest late, but same date as last year, -8th September. Worst harvest in all my experience of over forty years, a good all-round crop being practically ruined.

Hay.—Light crop, but secured in good order; about $4\frac{1}{2}$ tons. *Meadow-hay*—None.

Potatoes.—Yield very various; but some varieties, such as Up-to-Dates, a good crop; 8 to 10 tons. Slight disease in earliest varieties. Late in being secured, but keeping well.

Turnips.—Light crop of swedes; yellows a good crop. Swedes from 15 to 25 tons, and some cases over 30 tons; yellows 30 tons, and some cases 35 tons. Swedes slightly cankered.

No injury by insects or weeds.

Live Stock.—Pastures average. Stock thrive well, and were free from disease. *Clip of wool*—Average, and good quality. Prices slightly better than last year.

ABERDEENSHIRE (Buchan District). *Wheat*.—None grown in this district.

Barley.—Not grown to the same extent this year as in former years. Colour, and especially quality, not good. Very light weight in general—from 48 to 54 lb. About 3 bushels sown.

Oats.—Owing to the exceptionally wet season throughout after the month of June, and to much of the oat crop being destroyed by grub and the lateness of harvest, the crop was not as good as usual. Oats are very light—34 to 40 lb. per bushel, and in some exceptional places weight would be above 40 lb. 5 to 6 bushels sown.

Harvest was later than usual, not beginning until 20th September.

Hay.—120 to 150 stones. Not equal to last year, both in regard to quantity and quality, both as to ryegrass and clovers. *Meadow-hay*—Scarcely any grown.

Potatoes.—Not equal to last year's crop both as regards weight and quality; quality is not good this year.

Turnips.—Crop is deficient—about one-third in weight from last year, and in many cases more than half. A good field of swedes was not to be seen in the district. It would be difficult to state weights. Yellows were also a very light crop compared with former years. In fact, this is the worst crop of turnips for many years.

Crop greatly injured by grub; worst been for many seasons. Owing to excessive wet season the land under turnip was very dirty and foul.

Live Stock.—The pastures were of average growth. Stock thrive not so well as in a drier season. Cattle and sheep comparatively free from disease. *Clip of wool*—About the average of former years.

ABERDEENSHIRE (Formartine District). *Wheat*.—None grown.

Barley.—Last year, 28 bushels—this year, 28 bushels, with less than

an average bulk of straw. The bushel weight varies greatly, but the average would probably be about 52 lb.—i.e., similar to last year, but 3 to 4 lb. under the average of former seasons. The quality of grain is poor. Seed sown, 4 to 4½ bushels.

Oats.—Last year, 39 bushels—this year, 40 bushels; straw 20 per cent over average. The bushel weight varies from 33 to 42 lb., averaging about 2 lb. less than last year's poor quality, and 4 to 5 lb. less than the average of former seasons. Quality of grain and straw bad. Seed sown, 5½ to 7 bushels.

Harvest began about the same time as last year—i.e., nearly a month later than the average of former seasons. It was very protracted, owing to the unprecedentedly heavy rainfall. The crops were seriously damaged by sprouting and rotting in the fields and by heating in the stacks. The worst harvest since 1872.

Hay.—"Seeds"—i.e., ryegrass and clovers mixed—are cut for hay, and yielded about 30 cwt., or 2 cwt. less than last year. Quality fairly good. *Meadow-hay*—Almost none grown.

Potatoes.—Last year, 3½ tons—this year, 3 tons, or about 2 tons under the average of former seasons. Quality moderate. Not much disease, but tubers very small.

Turnips.—Owing to the wet season, the crop is in many instances almost a complete failure. It is difficult to estimate the average of crops which vary from 2 or 3 tons to 20 tons, but a general average throughout the district would be about half an ordinary crop. The crop braided well, and was ruined by rain.

Not much damage from insects, except to the crop of oats after leaf, which was badly grubbed in many fields, causing serious loss. The wet weather made it difficult to clean the land of knot-grass and couch-grass, but they did not damage the crops to any great extent.

Live Stock.—Pastures were far under the average of growth and quality. Stock did not thrive on them, because the grass was poor and the ground usually soaking wet. Cattle and sheep free from disease.

ABERDEENSHIRE (Strathbogie). *Barley*.—The disastrous results of crop 1902, and the poor prices realised for barley, made farmers devote a less breadth to it in the spring of 1903. It was well that such was the case, as owing to the sunless season and excessive rainfall the crop has been very deficient in quantity and quality—so bad, indeed, that a sample suitable for distilling purposes has been quite the exception. As a consequence the grain has been used up for feeding purposes. The yield may be stated at from 36 to 40 bushels, and the weight per bushel would range from 49 to 52 lb., while 50 lb. may be stated as a general average.

Oats.—This crop was generally thin on the ground, and the thinness may be attributed to an unusually heavy snowfall, which was followed by a somewhat rapid thaw, and which was succeeded by an unusually intense frost, just after the seeds had been deposited in the ground. As a consequence of this combination of unfortunate circumstances, much of the seed which was near the surface of the ground rotted and never sprang into life. When the plants began to appear above ground, grub worms became unusually active, and caused a great amount of damage in fields which were the least turfy.

The season being backward and the crops thin, caused the *Harvest* to be late—indeed, about three weeks behind an average season. Harvesting was somewhat tedious, and difficulty was experienced in securing the crops. The yield of grain and the quality of the produce are both unsatisfactory. Much of the grain weighs only about 36 lb. per bushel, and the general weight may be stated at least from 4 to 5 lb. below the weight of an average season.

Hay.—Generally a remarkably poor crop ; as a rule clover was thinner than is usually the case. Owing to the meteorological conditions, difficulty was experienced in getting it cured and secured.

Potatoes are of poor quality, as is the case in a wet and sunless season. The tubers are small in the run, and considerably under an average crop—perhaps little over half. British Queen has been introduced, but the variety has not done any better than older sorts ; on the whole, perhaps, not so well as Maincrops and Up-to-Dates. Champions are now almost out of cultivation, being considered too late for this inland district.

Turnips have been an unusually bad crop, except where the land was soft and naturally dry. On soft land the crop braided well, but on stiff land the plants made remarkably slow progress. On the latter class of land the crop is simply a failure. All over, the crop is less than half an average.

No destruction caused by insects. There was no particular injury caused by weeds, beyond the fact that surface weeds grew abundantly among the turnips and caused a great amount of cleaning to keep them down. This was no doubt owing to heavy rainfalls.

Live Stock.—In the early part of the grazing season pasture did fairly well, but later on most farmers complained of a want of growth, and little improvement in the stock. Stock of all kinds have kept free of disease.

Clip of wool—The quality was satisfactory, and the weight may be stated as average.

BANFFSHIRE (Lower District). *Wheat*.—None grown.

Barley.—Average crop 36 bushels, but bad quality, owing to prolonged wet weather during harvest ; average weight, 53 lb. ; 4 bushels sown. Fair crop of straw.

Oats.—An average crop of about 40 bushels ; of bad quality on the whole, some of it being extra soft. Fair yield of straw. $5\frac{1}{2}$ bushels sown.

Harvest about ten days later than usual ; a very long harvest owing to the wet weather.

Hay.—Good crop, but seriously damaged by wet weather. Good mixture of clover and ryegrass ; 30 cwt. *Meadow-hay*—None.

Potatoes.—Average crop ; of excellent quality, and free from disease ; about 5 tons.

Turnips.—The crop is such a failure that nobody could give an average weight, and yet there has been a yield of about 30 tons on one or two farms.

Oats on several parts were attacked by grub. Much more damage than usual. Turnips were badly damaged by weeds, as they could not be cleaned on account of the wet weather.

Live Stock.—Pastures of average growth, but feeding quality very poor, owing to wet weather and lack of sunshine. Stock thrived badly. Cattle and sheep free from disease. *Clip of wool*—Average weight and quality.

BANFFSHIRE (Upper District). *Wheat*—None grown.

Barley.—From 2 to $4\frac{1}{2}$ qrs. of return, mostly light, weights running from 45 to 52 lb. only, the result of the wet and sunless summer. The seed would be from 4 to $5\frac{1}{2}$ bushels.

Oats.—After lea, much injured by grub, and late in consequence ; clear land by it, crop hardly yielding an average of 4 qrs. over the region ; very light weights by the hillsides, 34 lb. common ; heavy soils, 39 to 41 lb. ; seed, 5 to 7 bushels.

Harvest from one to two weeks earlier than last year. The two years have been notably late and disastrous ones, all crops in general a month later, and very deficient in quantity and quality.

Hay.—The poorest crop on record. Firm on the root, light in fibre, and little or no clover. In very many cases under half a ton.

Potatoes.—Very spare crop; returns not sufficient for home consumption; no apparent disease either. The common varieties current, and all poor alike.

Turnips.—Better than last year generally, and some abnormal weights in competing fields, up to 40 and 50 tons. The average weight, however, would not amount to a half of these; rather stiff in brairding, but no cases of resowing.

Lea oats, as already remarked, were badly thinned by grubworm, and some fields were resown, while the general damage rendered the crop very late. Turnips, as last year, could not be horse-hoed to keep down weeds among drills, owing to prevalent rains.

Live Stock.—The two years might be cited as very bleak for pastures; too wet and cold; the pastures gave way very soon, and remained bare. The stock lost condition from August onward until house feed came on. Ringworm very noticeable amongst cattle in the autumn months. *Clip of wool*—About an average. Blackfaced stocks rather later of being shorn; now done well into July month.

NOTE.—In the case of the grain crops, frost intervened early in September, and much of the oats grown will be unfit for seed.

MORAYSHIRE. *Wheat*.—Not much sown. Average comes out at about 36 bushels—a bushel more than last year. Straw not quite so bulky as last year. Quality of both grain and straw fair. Seed sown, from 3 to 4 bushels.

Barley.—Average comes out at 33½ bushels, being half a bushel less than last year. Quality in many places very good. Weight about 2 to 3 lb. per bushel above the standard of 54 lb., the greater proportion of the crop in Morayshire being secured in splendid condition. Seed sown, from 3 to 4½ bushels.

Oats.—Average, about 40½ bushels—same as last year. In the early parts of Morayshire the quality of both grain and straw are very good, the greater proportion of the crop being secured in splendid condition; but in the later parts a good deal of damage was done with the long-continued wet weather. Seed sown, from 5 to 6 bushels; new varieties to 7 bushels.

Harvest began on early places about 2nd or 3rd September, but general about 9th September—about three weeks later than the usual time.

Hay.—Average about 25½ cwt., being 4 cwt. less than last year. Quality in many places very bad, being greatly damaged by the continued wet weather at hay-making. *Meadow-hay*—Scarcely any, and much about the same as last year.

Potatoes.—Average quantity comes out at 5 tons 4 cwt., about 3 cwt. less than last year; but returns from good cultivated land will come up to 7 or 8 tons. There is a little disease, especially in the pits. Not many new varieties.

Turnips.—Average comes out at 14 tons 14 cwt., being 2 tons 8 cwt. less than last year. Quality generally inferior to last year. The crop brairded very well, and very little resowing.

Not much damage done by insects. The only insect complained about is the turnip-fly. Owing to the continued wet weather, and the land in such a wet state, the weeds could not be kept down, and rather than damage the turnip crop many farmers preferred letting them alone until the spring, when the turnips are off.

Live Stock.—Pastures were about an average growth, but stock might have done better had there been more sun and heat. Stock thrived fairly. Cattle and sheep free from disease. *Clip of wool*—About an average.

NAIRNSHIRE. *Barley*.—2 to 3 bushels less than last year; quality mostly fair; seed, 4 bushels.

Oats.—Fair good crop; quantity much same as last year; quality good, and mostly got in in good condition; seed, 5 to 6 bushels.

Harvest began three weeks later.

Hay.—Fair.

Potatoes.—Good; little disease.

Turnips.—In some cases good, say 20 to 30 tons; in others much spoiled with canker, and not a half crop.

Owing to wet season could not be properly cleaned.

Live Stock.—Pastures during the season of average growth and quality with last year. Stock throve not so well owing to continual wet. Cattle and sheep free from disease.

INVERNESS-SHIRE (Inverness District). *Wheat*.—None grown in this district last year.

Barley.—Promised well, and had weather conditions been more favourable during harvest the crop would have been quite an average in quantity and quality. What was early secured was good weight and clean, but what was exposed to the unusual wet harvest suffered considerably. The quantity sown varies from 3 to 4½ bushels; quantity reaped, from 30 to 42 bushels.

Oats would have been an excellent and abundant crop had harvest been more favourable. Fine crops everywhere, and the yield would have been very abundant; but owing to the late and protracted harvest much of the straw and grain were considerably damaged by exposure to rain. There are, however, some fine sound grain in the lower districts suitable for seed purposes. Quantity sown, 4 to 6 bushels; quantity reaped, from 3 to 48 bushels.

The *Harvest* was the most protracted on record. It was about ten days later than usual in beginning. Shortly after commencing there were about three weeks of excellent weather, but it then broke, and it was almost impossible to secure the crops afterwards in good condition. Much of the grain was kept soaked for weeks, and the straw damaged considerably for fodder purposes; a large proportion of grain is being used for feeding purposes.

Hay.—There was a fair average crop. Clover was fairly abundant, and ryegrass about an average; yield, from 1½ to 2½ tons, according to condition of land. *Meadow-hay*.—None grown in this district.

Potatoes.—There was a fair crop, although under last year's average; very little disease in the district. Few new varieties planted, Up-to-Dates being the chief esculent. Some are being introduced with advantage.

Turnips.—This crop was considerably under an average. The wet season retarded laying down and cleaning land properly, and more finger-and-toe manifested itself in this district than in any former year.

There was very little damage done to crops by insects. Much charlock; wild-pea affected the white crops along the sea-side, while the usual couch and other weeds were very difficult to eradicate from turnip fields.

Live Stock.—The pastures were fair, but stock did not seem to thrive, and certainly did not pay grazing. Cattle and sheep free from disease. *Clip of wool*.—An average.

INVERNESS-SHIRE (Skye). *Wheat*.—None grown.

Barley.—None grown.

Oats.—An average crop, but grain rather light.

Harvest.—Rather earlier than usual.

Hay.—A poor crop. *Meadow-hay*.—An average crop.

Potatoes.—A good crop, except in some low-lying patches where frost in June did damage. Quality good; no disease; no new varieties planted.

Turnips.—A poor crop; only one sowing.

No injury by insects or weeds.

Live Stock.—Pastures were backward early in the season, but improved very much after midsummer. Stock thrived well during last half of summer and autumn. Cattle and sheep free from disease. *Clip of wool*—Average.

INVERNESS-SHIRE (Lochaber). *Wheat*.—None grown.

Barley.—Very little grown.

Oats.—Light crop; about 3 quarters. Straw fully as good as last year. Quality of grain much deteriorated by protracted rains. Seed generally about 6 bushels.

Harvest began about three weeks later than usual.

Hay.—15 to 20 cwt. *Meadow-hay*.—Fair crop, but most difficult to save.

Potatoes.—Yield, about 4 tons. Owing to very wet conditions of season potato crop inferior, small in size, and attacked by disease about middle of September. Few or no new varieties.

Turnips.—Weight about 5 tons; quality fair. Braided well; no second sowing. This crop also suffered from excessive rains.

Not much injury by weeds, except where potatoes or turnips failed somewhat from too much rain.

Live Stock.—Pastures below average. Stock thrived not so well as usual. Cattle and sheep free from disease. *Clip of wool*.—Under average. Sheep on hill pastures suffered from the prevailing cold and wetness of the summer.

ROSS-SHIRE (District of Dingwall and Munlochy). *Wheat*.—Still less sown.

Barley.—Quantity and quality of grain and straw nearly average; yield, say, 36 bushels; seed sown, quite 4 bushels.

Oats.—Quantity and quality of grain and straw average; yield, say, 44 bushels; seed sown, 5 bushels.

Harvest began first week September—say ten days later than average; was very protracted owing to wet weather. One-third of the crop of barley and oats; both corn and straw is much deteriorated.

Hay.—Quantity of crop was below average; quality average. Clovers not nearly so plentiful as usual; weight, $1\frac{1}{4}$ ton.

Potatoes.—Yield was better than last year; no disease to notice. Not many new varieties tried. Weight, say, 5 tons; not a few acres were not secured ere frost came.

Turnips.—As a whole, braided fairly; no second sowing. Finger-and-toe was very prevalent, reducing the average weight much. Swedes, say 8 to 16 tons; yellows, 8 to 14 tons.

No injury by insects or weeds.

Live Stock.—Pastures were not of average growth and quality with last year; season cold early, and also at end of season. Stock thrived well, and were free from disease. *Clip of wool*.—Average.

ROSS-SHIRE (Tain, Cromarty, and Invergordon District). *Wheat*.—Very irregular; average in dry bank land, below average in cold and clay land; 36 bushels in former, 30 to 32 in the latter. 4 bushels seed generally sown.

Barley.—Quite average; good quality where not too much laid; yield, 44 to 46 bushels.

Oats.—Average on light land, 25 to 27 cwt.; below average on heavy or cold lands by 25 per cent.

Harvest began 7th to 10th September—ten to fourteen days later than usual.

Hay.—Average on light land, 25 to 27 cwt.; below average on heavy or cold land by 25 per cent. *Meadow-hay*.—None grown in district.

Potatoes.—Quite average; of good quality; little or no disease.

Turnips.—Very variable. Full crop yellows on light, warm land; almost full crop swedes on ditto. Both yellows and swedes on cold land not over two-thirds of average crop. A lot of finger-and-toe.

Not much damage by insects. Owing to wet weather weeds got the upper hand in many places.

Live Stock.—Pastures average growth, but owing to cold and damp live stock did badly. Both cattle and sheep free from disease. *Clip of wool*.—Average crop and quality.

SUTHERLAND. *Wheat*.—None grown in this district.

Barley.—In 1902 the average quantity of grain would be from 35 to 40 bushels, and fair quality. As regards grain and straw, in 1903 the average quantity of grain was less by 4 bushels, and the quality both of grain and straw inferior to previous year.

Oats.—In 1902 average quantity of grain from 35 to 48 bushels; grain and straw good quality. In 1903 quantity of grain one-quarter less; quality inferior, and straw considerably damaged by bad harvest weather.

Harvest about a month after usual time.

Hay.—From one-third to one-half less than previous year. In 1902 average would be from 1½ to 2 tons; in 1903, average ¾ to 1½ ton.

Meadow-hay.—A fair crop; similar to previous year.

Potatoes.—One-third less. Quantity this year would be from 3 to 4 tons. Not much disease. Sutherland is not much of a potato-growing county, beyond requirements of tenants, servants, &c., in respective farms and crofts.

Turnips.—Crop very irregular, and as a rule from one-third to one-half short from previous year. On many farms more than one sowing was required. Average weight not more than from 6 to 12 tons.

A considerable more quantity of weeds than usual in green crops.

Live Stock.—Pastures did not attain their usual roughness last summer; growth ceased earlier, and in autumn grass was bare and scarce. Stock thrived wonderfully well. Cattle and sheep free from disease. *Clip of wool*.—Excellent; quality good, and over an average.

CAITHNESS-SHIRE. *Wheat*.—None grown.

Barley.—Crop deficient, greatly owing to rains; seed 4 to 5 bushels.

Oats.—In many places not half a crop, and grain very light; 28 to 35 lb., with large proportion of "tails." Normal weight of 40 lb. is extremely rare. Straw bulky, but long exposed in stook or hand-screw to drenching rains and frosts. Unless the grain was past the "milky" stage before the 7th October, frosts checked development and "whitened" grain and straw, making reliable seed very scarce. May and June were continuously dry; following months were very wet.

Harvest began some days later than 1902, which was also an October harvest. The rains made the work very protracted both in cutting and leading, while the wet state of the ground made deep ruts and heavy work for the machines. Not since 1816 has there been such a disastrous harvest.

Hay.—About 1½ ton, but with little foggage, and ryegrass seed saved with difficulty. *Meadow-hay*.—Crop was secured with great difficulty, and a short crop.

Potatoes.—In some places tubers were a fair crop of about 4 tons, but

largely diseased when handled. Flavour of Champions good. Irish Cups and Fortyfolds to Ninetyfolds are grown, but found liable to disease.

Turnips.—In many places are a complete failure, though laid down in the best of tilth and germinating quite well. The plants seem to have been “drowned” by the continuous rains, and the crop is blanky and small. Yet there are a very few places with yields of 18 to 20 tons.

Oats were extensively injured by grub. For long into the season parts of ley fields kept black, and grubs of Daddy-long-legs, or “leather jackets” were very numerous, and the damage exceeds any former record. Thistles, coltsfoot, skellock, and spurrey are apt to increase. This year the scuffling of turnips could not be done to advantage in the wet.

Live Stock.—Pastures suffered, and became very bare at latter end of season. Stock thrived fairly well. Cattle and sheep were generally healthy; fluë anticipated in sheep. *Clip of wool*—Average, and of good quality, but prices low.

ORKNEY. *Wheat*.—None grown.

Bere.—The average yield was about 28 bushels, weighing about 46 lb. per bushel; seed, $3\frac{1}{2}$ to $4\frac{1}{2}$ bushels.

Oats.—Owing to the late seed-time and the cold sunless summer, oats were slow in ripening, and a good deal was cut with a green shade. Straw is less in bulk than last year, and grain is also less in bulk, and 2 or 3 lb. per bushel lighter than last year. Average, 24 bushels, weighing 34 lb.; seed, 4 to 6 bushels.

Harvest was as late as last year, being a month later than usual.

Hay.—A light crop; weight about 17 cwt.

Potatoes.—A fair crop; weight about 5 tons.

Turnips.—Owing to drought, brairded very irregularly, and heavy rains in August and September stopped growth in wet and shallow soils. Crop very irregular; some fields good, others very poor; weight about 8 tons.

Cold, dry weather in June checked growth of oat braird, and enabled grub to do a good deal of damage. Weeds injured crops in wet ground.

Live Stock.—Pastures were very bare all season. Stock healthy, but came in off pasture in lean condition. *Clip of wool*—Average.

SHEPHERD. *Wheat*.—None grown.

Barley.—Both grain and straw superior to last year in quantity and quality.

Oats.—Both grain and straw superior to last year in quantity and quality, but still hardly an average crop.

Harvest about a week later than the usual time.

Hay.—Both ryegrass and clovers in quantity and quality inferior to last year. *Meadow-hay*—Fair; about the same as last year.

Potatoes.—Better both in quantity and quality than last year; no disease. No new varieties.

Turnips.—Both in quantity and quality about equal to last year. Owing to want of rain the crop did not braird well, and in many places a second sowing was required.

No damage by insects, and no injury from weeds.

Live Stock.—Pastures not up to an average, and inferior in growth and quality to last year. Stock thrived fairly, but below average. Cattle and sheep free from disease. *Clip of wool*—In quantity about an average; in quality very good.

THE METEOROLOGY OF 1903.

The following table gives a comparison of the winds, pressure, temperature, rainfall, cloud, and sunshine for 1903 as compared with averages of the forty-seven years from 1856 to 1902:—

1903.	DIRECTION OF WINDS—DAYS.									Wind Force, scale 0 to 12.	Mean Pressure in inches.	Mean Tempera- ture, degrees.	Rainfall.		Mean Cloud, scale 0 to 10.	Sunshine in hours.
	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calms.				In inches.	No of days.		
Jan. .	0	0	-1	0	+1	0	+1	-1	0	+0.3	-0.050	-0.7	+2.18	+3	-6.2	-8
Feb. .	-1	-1	-2	-1	0	+3	+3	0	-1	+0.3	-1.105	+3.9	+3.05	+4	+0.0	-27
March. .	-2	-2	-3	0	+2	+6	+1	-2	0	+0.4	-0.810	+1.7	+3.12	+10	+0.2	-16
April .	+1	0	-1	0	-2	-1	0	+3	0	-0.1	-0.056	-2.6	-0.30	+2	0.0	-4
May .	0	+1	+3	0	-1	0	-1	-1	-1	-0.3	-0.037	-0.1	-0.20	+1	+0.3	-17
June .	+1	+3	+2	0	-1	-2	-2	0	-1	-0.3	+1.154	-1.4	-0.56	-1	+0.4	-7
July .	+1	+1	+1	+1	0	-2	-1	0	-1	0.0	-0.040	-1.6	+1.25	+2	+0.6	-4
August .	0	-1	-1	-1	-1	+1	-3	+1	-1	+0.1	-1.150	-2.2	+1.91	+3	0.0	+15
Sept. .	0	-1	+2	+3	+1	-2	-2	0	-1	-0.3	+1.118	-0.3	-0.40	0	-0.2	+21
Oct. .	-1	0	+1	+1	+1	+1	-1	-1	-1	-0.2	-0.365	+0.6	+3.53	+10	+0.7	-20
Nov. .	0	-1	-2	-1	-1	0	+3	+3	0	-0.3	+0.076	+0.0	-0.63	+3	-0.5	+7
Dec. .	-1	-1	+2	+3	+2	-3	-2	-1	+1	-0.7	-0.096	-1.6	-0.77	+1	+0.4	-5
Year .	-2	-2	+1	+5	+1	+1	+2	+1	-6	-0.3	-0.077	-0.3	+12.28	+40	+0.25	-60

Hence the prominent characteristics of the weather of 1903 were an unprecedentedly large rainfall for the year; excessive amounts for January, February, March, and October, the amounts for March and October not having been exceeded in any previous year; falling on the largest number of days hitherto recorded, being ten days in excess of the average in March and October respectively; and a very large deficiency of sunshine, being under the average in every month except August, September, and November, the number of hours under the average being sixty. The heavy and frequent rains, the clouded skies, and deficient sunshine resulted in a luxuriant pasturage in the fields not often seen, further prolonged into the colder months of the year by the mildness which then prevailed.

JANUARY.—The mean temperature was $36^{\circ}5$, or $0^{\circ}7$ below the mean, the days being $0^{\circ}9$ and the nights $0^{\circ}4$ below their means. In Shetland, Orkney, and along the east coast the difference from the average was slight; in the south, difference was nearly a degree; but in inland situations the difference amounted to about a degree and a half, and in some places even higher. The first week was extremely mild; but on the 10th severe frost set in, reaching its intensity from the 14th to

the 17th. For the rest of the month mild weather prevailed. The difference between the temperature at the middle of the month and the last week was very great. Thus at Leith the mean temperature for the week ending the 17th was $31^{\circ}0$, whilst for the last week of the month it was $46^{\circ}7$. The absolutely highest temperature was $55^{\circ}0$ at Crathes on the 30th, and the lowest $1^{\circ}0$ at Braemar on the 13th.

The mean rainfall was 6.04 inches, or 56 per cent in excess of the average, being the largest rainfall in January since 1877, which in that year was 6.96 inches. The excess was everywhere well marked in the mainland, double the average being reached at Paisley, Glasgow, Edinburgh, Leith, Loch Leven, Montrose, Lednathie, Kingussie, and Fort Augustus. The least excess occurred in the extreme north and north-west, the excess at several places being under 20 per cent. From the 11th to the 20th little or no rain fell, whilst the first ten days and the last ten days were very wet, many daily amounts being recorded. The two wettest days were the 29th and 30th. The heavy rainfalls of the 9th were chiefly the snow and sleet which accompanied the easterly gale of that day. At Ben Nevis 4.78 inches fell on the 29th, and there the rainfall of the month amounted to 33.45 inches.

The mean number of hours of sunshine recorded by the sunshine recorder was 28, being 5 hours less than the average.

FEBRUARY.—The mean temperature was $42^{\circ}2$, or $3^{\circ}9$ above the average, the days being $4^{\circ}1$ and the nights $3^{\circ}6$ above the average. In February 1882 the mean was $42^{\circ}3$, these being the two highest mean temperatures of this month since 1856, when the Society was founded. The excess was greatest in the south and in inland situations south of the firths of Forth and Clyde, where in several places it exceeded $5^{\circ}0$; and least in the north and at stations near the sea. In Shetland and at Monach and Barra Head the excess was only slightly above a degree. The warmest day of the month was the 19th, except in the south, where it was generally the 9th. The coldest days were the 1st, 13th, and 28th, and but little frost was reported; indeed, at several stations the temperature did not fall to 32° . The absolutely highest temperature was $59^{\circ}0$ at Gordon Castle on the 19th, and the lowest $22^{\circ}8$ at Lednathie on the 26th.

The mean rainfall was 6.10 inches, or double the average, being the heaviest rainfall on record for this month except that of 1894, when the mean amount was 7.05 inches. In Aberdeenshire the amount barely exceeded the average, and in the south of Wigtownshire was slightly under it. Elsewhere it greatly exceeded the average, the excess being at a few places only less than 60 per cent, at many more 100 per cent, and at a few

more than 150 per cent. A great storm of snow, sleet, and hail occurred generally on the 7th and 8th; destructive floods were general throughout the country, and on the 10th the Clyde burst its banks at Rutherglen. On the last ten days of the month the rains were persistent and heavy. The total rainfall on Ben Nevis was 36·24 inches, being 22·70 inches above the average. The amounts at Fort William were 16·46 inches, at Stronvar 15·13 inches, at Leadhills 14·03 inches.

This heavy rainfall and high temperature were accompanied by an excess of six days of W. and S.W. winds, and gales from the S.W. were frequent; indeed high winds were almost continuous from the 19th onwards. The gale of the 27th was of unusual severity.

The mean number of hours of sunshine was 26, or 32 less than the average.

MARCH.—The mean temperature was 41°·1, or 1°·7 above the average, the days being 1°·3 and the nights 2°·0 above their respective averages. In the southern counties and in Upper Deeside the excess was generally more than 2°·0, whereas in coast situations it was less than a degree. During the first week temperature was rather under the average; but for the rest of the month it remained continuously above, the highest temperatures being generally recorded on the 22nd, 25th, and 31st. The unusually high temperatures of the month are well indicated by the circumstance that at Greenock, Glasgow Observatory, and Leith temperature did not fall to 32°. The absolutely highest temperature was 57°·8 at Corstorphine on the 20th, and the lowest 22°·0 at Kingussie and Lednathie on the 7th.

The mean rainfall was 5·96 inches, or 110 per cent above the average, being considerably the largest rainfall for March yet recorded by the Society. The number of rainy days was no fewer than ten days above the average. At a considerable number of stations rain fell on every day of the month. Only at a few places, and these all on the east coast, was rain recorded on fewer than twenty days. In the extreme south-east the rainfall was about the average; in a great part of the counties of Aberdeen and Banff there was a well-marked deficiency; and at several stations in the counties of Sutherland, Caithness, and Orkney there was also a deficiency. In all other parts there was a very large excess, the amounts being generally much more than twice, and at several places considerably more than thrice the average. The heaviest rainfalls were, in inches, 20·99 at Glenquoich, 18·31 at Stronvar, 16·49 at Leadhills, 15·90 at Fort William, and 12·56 at Greenock. On Ben Nevis the total was 37·96 inches, being 23·47 inches above the average.

Winds from W., S.W., and S. prevailed nine days more than the average for March. These were generally very high winds, frequently reaching the force of a gale during the latter half of the month. In no previous year since the Society was founded were these west-south-westerly winds so prevalent and the accompanying rainfall so heavy.

APRIL.—The mean temperature was $41^{\circ}\cdot4$, or $2^{\circ}\cdot6$ less than the average, the days and nights being nearly equally low. The defect in temperature was everywhere well marked, being however distinctly greater in inland and eastern situations than in the west, where at several stations the deficiency was $3^{\circ}\cdot5$. During the first ten days of the month westerly winds prevailed, and temperature was high and rose steadily. Thereafter northerly and easterly winds prevailed, bringing on a spell of cold weather, when temperature in several cases fell lower than any recorded since January. At only a few stations did the temperature reach $60^{\circ}\cdot0$. At Ochertyre ground frost was registered on twenty days, at Inverness twenty-one days, at Fort William sixteen days, and at Edinburgh seventeen days. The contrast in temperature between the week ending the 11th and the week following was very great: thus at Glasgow the means were respectively $45^{\circ}\cdot6$ and $36^{\circ}\cdot7$. The absolutely highest temperature for the month was $61^{\circ}\cdot5$ at Lednathie on the 9th, and the lowest $16^{\circ}\cdot0$ at Stobo Castle on the 15th.

The mean rainfall was 1·92 inches, or 14 per cent below the average. Its distribution over the country was strikingly irregular, being above the average to the north of a line drawn from Stornoway to Glenquoich, Inverness, and Haddo House. Elsewhere it was under the average. The excess was great in the counties of Shetland, Orkney, Caithness, Sutherland, and eastern districts of Ross, being generally from 50 to 75 per cent, and at Holburn Head and Invershin double the average was collected. On the other hand, only about half the average was collected at many places in the counties of Forfar, Perth, Fife, Dumbarton, Renfrew, Ayr, Edinburgh, Haddington, and in Tweeddale. No rain fell from the 13th to the 26th at Fort William, and only on four days between the 7th and the 29th at Greenock. Daily amounts exceeding an inch were of rare occurrence, and the rainfall of April was in every way a contrast to the previous three months of the year.

MAY.—The mean temperature was $48^{\circ}\cdot9$, or $0^{\circ}\cdot1$ below the mean, the days and nights being near the average. Nearly one-half of the stations had a mean temperature within half a degree of the average. During the first half of the month temperature was continuously low, and on the morning of the

11th, which was generally the coldest day, frost occurred at many places, and at Glasgow and Braemar the gross minimum fell to $23^{\circ}0$. After the 20th temperature was almost uniformly high, particularly during the last week of the month. The absolutely highest temperature was $79^{\circ}7$ at Dumfries on the 31st, and the lowest $20^{\circ}0$ at Stronvar on the 19th.

The mean rainfall was 2.09 inches, or 9 per cent below the average. There was a decided excess in the greater part of Aberdeenshire, in Banffshire, along the Caledonian Canal, and in the south-west of Scotland, amounting to 48 per cent at Cargen, 36 per cent at Paisley and Haddo House, and 30 per cent at Fort William and Fort Augustus. Elsewhere there was a pronounced deficiency exceeding 40 per cent at Braemar, in Perthshire, East Lothian, Peeblesshire, and Berwickshire. The rain fell chiefly from the 1st to the 6th and from the 13th to the 17th, but at many places considerable falls occurred on the 30th. The fall on Ben Nevis was 6.61 inches, or 12 per cent below the average. Snow fell at a few places during the second week.

JUNE.—The mean temperature was $53^{\circ}5$, or $1^{\circ}4$ below the average, the days being $1^{\circ}1$ and the nights $1^{\circ}7$ below their averages. In the counties of Bute and Renfrew, and at Poltalloch and Dumbarton, the temperature was slightly above the average; but over the country generally there was a decided deficiency, ranging from $3^{\circ}0$ at Inverness, Nairn, Peterhead, and Montrose, to less than $1^{\circ}0$ at Ochtertyre and Bucklyvie, in the Glasgow and Edinburgh districts, and at Duns, Dumfries, and Cally. A ground frost occurred in the north and west; from the 4th to the 8th high temperatures were recorded. Persistent winds from N.E. then set in, bringing very cold weather, the temperature falling below $32^{\circ}0$ at several places on the 20th. The mean temperature of the third week was $7^{\circ}0$ at Aberdeen and $6^{\circ}0$ at Leith below the average of the week. The absolutely highest temperature was $82^{\circ}0$ at Smeaton on the 4th, and the lowest $26^{\circ}5$ at Kingussie on the 20th.

The mean rainfall was 2.02, or 22 per cent below the average. In Nairnshire, and from Inverness along the Caledonian Canal as far as Invergarry, there was a well-marked excess, amounting at Invergarry to 42 per cent. Rainfall was also above the average in the counties of Shetland, Forfar, Fife, Dumbarton, Renfrew, and Wigtown. Generally elsewhere there was a deficiency, which exceeded 50 per cent along the west coast from Cape Wrath to Poltalloch and at Wolfelee and Bowhill, 40 per cent at Braemar, Edinburgh, and Stobo Castle, and 30 per cent in many districts. The greater part of the rain fell during the last few days of the month, and at many places there were only

one or two rainy days during the first three weeks. The heaviest daily amounts were 1·42 inch at Fort William on the 30th, and 1·40 inch at Kilmarnock on the 27th. On Ben Nevis the amount was 6·44 inches, or 1·10 inch less than the average.

Thunderstorms occurred at many places on the 24th, 25th, and 29th, developing the greatest intensity in Perthshire.

JULY.—The mean temperature was 55°·6, or 1°·6 below the mean, the days being 1°·7 and the nights 1°·5 below the mean. In Mid-Lothian and Fife temperature was near the average, but generally over the country there was a well-marked deficiency, ranging from about half a degree in the extreme south to about 3°·0 at Peterhead, Nairn, Dunrobin, and Wick. On the other hand, from Skye to Corsewall the deficiency was only about a degree. The month began with temperatures much above the average, followed by a short cold period, then fairly high temperatures from the 9th to the 11th. During the third week cold easterly winds with low temperatures prevailed, and again from the 27th to the 29th. At only about a third of the stations did the temperature rise to 75°·0. At Fort William on the night of the 13th the grass thermometer fell to 31°·1. The absolute maximum was 80°·0 at Dumfries on the 2nd and Balruddery on the 10th, and the minimum 33°·0 at Wolfelee on the 8th.

The mean rainfall was 4·50 inches, or 43 per cent above the average, being the largest rainfall for July since 1888, when the mean was 4·69 inches. Except over a limited area in the Glasgow district, where the amount was nearly the average, there was a decided excess, which was most pronounced towards the north-eastern counties, the excess being fully 75 per cent at Perth, Lednathie, Montrose, and Aberdeen, about 95 per cent at Aberdeen and Dunrobin, and 107 per cent at Haddo House. At a large number of places near the west coast the excess did not amount to 25 per cent, and at one or two places fell even below the normal. At the beginning of the month there were heavy rainfalls, especially in the north and north-east, and also about the middle of the month at stations in the east and south. A good deal of rain fell towards the end of the month. At Ben Nevis the amount was 13·26 inches, or 2·47 inches above the mean.

On the 5th and 6th strong winds and gales from N. and N.W. prevailed. Fogs were prevalent on north and west coasts from the 8th to the 10th, in the south-east on the 16th and 17th, and in the east and north towards the end of the month.

AUGUST.—The mean temperature was 54°·4, or 2°·2 below the

normal, the days being $2^{\circ}1$ and the nights $2^{\circ}3$ below their averages. Temperature was everywhere deficient, by less than a degree in the Edinburgh district, by less than $2^{\circ}0$ at stations near the west coast. On the east side of the country, from the Pentland Firth to the Tay, the deficiency was about $3^{\circ}0$. There was a noteworthy absence of high temperatures, only about one-fifth of the stations reporting a maximum of $70^{\circ}0$ or upwards. At the beginning of the month temperature was about the average, but thereafter it remained almost continuously below the mean, the coldest week that ending the 22nd, the mean of which was $5^{\circ}5$ under the average at Ochtertyre, and $3^{\circ}7$ at Aberdeen and Fort William. The absolutely highest temperature was $74^{\circ}0$ at Clathick on the 1st, and the lowest $32^{\circ}5$ at Lednathie on the 25th.

The mean rainfall was 5.53 inches, or 53 per cent above the average, the month being the wettest August since 1877, when the mean was 6.35 inches. In the counties of Ayr, Nairn, and at Inverness the fall was under the average, but in other parts of the country it was in excess of the average. The excess was comparatively small in Tweeddale and along the shores of the Solway. In other districts it was large, and in several places excessive, being in percentages 176 at Lairg, 164 at Paisley, 140 at Stornoway and Island Glass, 110 at Glenquoich, Invergarry, Fort William, and Rothesay, and about 90 at Lednathie, Ochtertyre, Stronvar, and Drumlanrig. The largest daily amounts were 2.05 inches at Lednathie on the 31st and 1.57 inch at Fort William on the 26th. At Stronvar there was only one rainless day and at Glencarron only two. The least rainy period was from the 15th to the 25th. On Ben Nevis the monthly amount was 20.97, or 7.62 inches above the mean.

Thunder was unusually frequent, chiefly from the 11th to the 23rd. Gordon Castle reported thunder on nine days. Gales were generally reported on the 26th and 30th, and the weather of the month was unsettled. The sunshine showed an excess of 15 hours above the average.

SEPTEMBER.—The mean temperature was $52^{\circ}5$, or $0^{\circ}3$ under the normal, the days and nights respectively being equally under their normals. Few of the stations differed from their averages by as much as a degree. At coast stations from Aberdeen to the Tweed, the general deficiency exceeded a degree, but in western districts the excess was distinctly marked, exceeding a degree at several stations. The month opened with fairly high temperatures, but thereafter a spell of cold weather set in with E. and S.E. winds. The lowest temperatures were generally on the 15th, falling below $32^{\circ}0$ at about a third of the stations, ground frost occurring for two or three successive

days in many districts. During the last ten days temperature was again high. The absolutely highest temperature was $72^{\circ}0$ at Fort William on the 20th, and the lowest $27^{\circ}0$ at Braemar and Crathes on the 15th.

The mean rainfall was 3.20 inches, or 11 per cent below the average. At Wolfelee and the Mull of Galloway there was an excess of 31 per cent, and at a few scattered places in the counties of Aberdeen, Perth, Dumbarton, Renfrew, Lanark, and Kirkcudbright the amounts were fractionally above the average. But in general there was deficiency, slight in southern and eastern districts, but becoming more pronounced towards the north and west. Thus Berwickshire and Mid-Lothian were about 10 per cent short of the average, whilst Gordon Castle, Nairn, and Glencarron had an excess of nearly 40 per cent, and Braemar, Kingussie, Fort Augustus, Inverness, and Stornoway of between 20 and 30 per cent. Most of the rain fell during the first ten days of the month; at places in the east and south-east heavy falls occurred on the 2nd. From the 13th to the 21st little rain fell anywhere, and at several stations in the north but little during the rest of the month. But elsewhere towards the end of the month the weather became again wet and unsettled. On Ben Nevis the rainfall was 4.23 inches under the average.

Dense fogs occurred in the east from the 23rd to the 27th, and in the north from the 23rd to the 30th.

OCTOBER.—The mean temperature was $47^{\circ}1$, or $0^{\circ}6$ above the normal, the days being of average temperature and the nights $1^{\circ}3$ above. In the southern counties there was a well-marked excess, amounting at Edinburgh and Leith to $2^{\circ}3$, whilst north of the Forth and Clyde several stations showed a deficiency, and a large number approximated to the average. The month opened with fairly high temperatures, the maximum for the month at most places being on the 1st. A cold spell followed with minimum readings generally on the 10th; but thereafter temperature remained almost continually above the average, except on the 24th and 29th. At about a third of the stations temperatures below freezing were not recorded, except at the more elevated stations. The absolute maximum temperature was $69^{\circ}0$ at Haddo House on the 1st, and the minimum $25^{\circ}0$ at Stronvar on the 10th.

The mean rainfall was 7.57 inches, or 87 per cent above the normal, being the highest mean on record for October. Everywhere the rainfall was above the average. But to south of a line drawn to south of the Tay to Mull nearly every district reported considerably more than double the average amount. The relative excess was less to the north of this line, but at only

a very few places was the excess less than 40 per cent. At no more than two-fifths of the stations was the fall less than 6·00 inches, whilst about one-fifth had a fall of more than 10·00 inches, the heaviest falls being 15·71 inches at Lochbuie, 15·58 inches at Stronvar, 14·39 inches at Leadhills, 13·43 inches at Glencarron, 12·46 inches at Fort William. At Stronvar, Glasgow, Broonlands, and a few other places, rain fell on every day of the month, whilst at many places there were only one or two rainless days at most. The average number of rainy days was twenty-seven, or ten days more than the average. The wettest periods were from the 3rd to the 8th, and the 24th to the 29th. Unusually heavy daily falls were recorded. On Ben Nevis the monthly amount was 18·66 inches, or 3·24 inches above the normal.

The weather of the month was exceptionally wet and unsettled, and especially stormy from the 11th to the 16th. In the north there were auroras on the 13th and 31st, the latter being of a very brilliant character, and associated with a magnetic storm of great intensity.

NOVEMBER.—The mean temperature was 41°·5, or 0°·6 above the normal, the days being 0°·8 and the nights 0°·5 above their averages. In Shetland, Orkney, and the north-east coast as far south as Montrose, temperature was under the average, but in other districts there was a general excess, amounting at about a fourth of the stations to upwards of a degree. The month opened with temperatures much above the average, but in central and southern districts low temperatures were recorded. Thereafter cyclonic conditions prevailed with higher temperatures, the maximum for the month being generally on the 12th. Under the influence of northerly winds temperatures were low from the 16th to the 18th, and after some days of milder weather the month closed with severe frost, with lowest temperatures everywhere on the 30th. The absolute maximum was 58°·2 at Inverness on the 14th, and the minimum 15°·0 at Leadhills on the 30th.

The mean rainfall was 3·21 inches, or 16 per cent below the average. In northern counties there was a decided excess, amounting to upwards of 50 per cent at several places. On the other hand, in central and southern districts the month was a dry one, and in most districts of the counties of Forfar, Perth, Fife, Upper Deeside, and Lower Tweeddale less than half the average amounts were collected. In the Border counties the deficiency was about 40 per cent, in the Lothians from 30 to 40 per cent, and in Clydesdale from 20 to 30 per cent, while in the extreme south-west it was only about 10 per cent. The rainiest days were the 1st, 2nd, 8th to the 14th,

and 21st to the 28th. On Ben Nevis the monthly amount was 17·27 inches, or 2·68 inches above the average. On the 27th there occurred a snowstorm generally over the country.

DECEMBER.—The mean temperature was $36^{\circ}\cdot4$, or $1^{\circ}\cdot6$ below the normal, the days being $2^{\circ}\cdot0$ and the nights $1^{\circ}\cdot1$ below their averages. Temperature was slightly above the average in Shetland and Orkney, but everywhere on the mainland of Scotland it was under the average, the defect being less than a degree on the east coast from Arbroath to the Tweed. It was between $1^{\circ}\cdot0$ and $2^{\circ}\cdot0$ at the majority of stations. The greatest defect was $4^{\circ}\cdot5$ at Lairg and Nairn; and it was also large in central Ross-shire and along the Caledonian Canal from Fort William northwards. During the first week cold weather prevailed, thereafter till the 24th brief mild and cold spells alternated, and during the last week severe frost prevailed generally over the country. The absolute maximum temperature was $57^{\circ}\cdot0$ at Glencarron on the 21st, and the minimum $11^{\circ}\cdot5$ at Kingussie on the 2nd, and at Fort Augustus on the 30th.

The mean rainfall was 3·39 inches, or 19 per cent below the normal. At Lednathie there was an excess of 44 per cent, and from about Montrose westwards through Perthshire, and then southwards to Rothesay, the amount was only the average or but slightly in excess of it. In all other parts of Scotland there was a deficiency, increasing in southern Scotland from west to east; and as regards the country generally it was greatest to the north of the Caledonian Canal and along the south foreshores of the Moray Firth, amounting at several stations to from 50 to 80 per cent. Some heavy daily falls occurred on the 2nd and 21st. Except on the east coast, little rain fell after the 22nd; on Ben Nevis the monthly amount was only 6·8 inches, being 12·30 inches less than the average of December.

Storms occurred on the 2nd, 3rd, 7th, and 21st, but in general winds were light. Dense land fogs occurred during the month.

The harvest of 1903 was a very late one in all parts of the country, being, as regards the commencement of cutting, from three to four weeks late in many districts, and exceptionally late with respect to the ingathering of the crops to the stackyard. Indeed in many districts it was considered as the latest in the recollection of the inhabitants, and not a little of the grain never reached the stackyard at all, but lay rotting in the fields owing to the absence of drying weather from September onwards.

In a few places only the *wheat* and *barley* crops attained the average. This point was reached more generally by *oats*, but as regards this crop, the damage by the wet weather was the greatest.

Potatoes, except in a few districts, were at least a fair average crop, and disease, except in some of the central districts of Scotland, was practically absent.

Turnips were generally a variable crop, varying from a third to a half crop in several districts to about an average crop in eastern districts from the Tweed to the Grampians.

AGRICULTURAL STATISTICS.—RETURNED UPON 4TH JUNE 1903.—(Compiled from the Government Returns.)

TABLE No. 1.—ACRAGE UNDER EACH KIND OF CROP, BARE FALLOW, AND GRASS, IN EACH COUNTY OF SCOTLAND.

COUNTIES.	CORN CROPS.						GREEN CROPS.										Total Acreage under Crops, Bare Fallow, and Grass.				
	Wheat.	Barley or Bave.	Oats.	Rye.	Beans.	Peas.	Total.	Potatoes.		Turnips.	Mangels.	Cabbage and Rape.	Vetches or Tares.	Other Green Crops.	Total.	Clover, and Rotation.		Permanent Pasture (Land).	Flax.	Small Fruit.	Bare Fallow or Uncropped Arable Land.
								Acre.	Acre.												
1. Aberdeen . . .	680,642	7	189,363	132	493	320	212,806	7,311	89,521	8	163	2,473	339	99,612	285,053	92,527	334	248			
2. Argyll . . .	136,210	1,123	17,491	454	111	6	19,485	4,380	6,664	80	228	17	38	10,335	79,872	20,662	38	344			
3. Arv . . .	321,159	787	9,959	437	863	10	48,110	8,928	6,024	603	892	22	196	17,325	97,666	167,516	157	116			
4. Banff . . .	159,996	8,014	49,050	48	118	48	57,883	1,963	22,200	4	26	806	12	26,091	67,818	9,103	17	82			
5. Berwick . . .	191,889	1,871	19,006	33,134	10	960	55,616	2,308	20,301	326	839	443	11	80,288	59,325	46,000	24	76			
6. Bute . . .	25,956	87	4,893	72	60	2	6,004	974	1,367	10	102	2	44	2,469	8,546	9,779	74	274			
7. Caithness . . .	111,893	1,006	33,374	127	22	12	54,542	1,647	18,147	5	87	858	23	15,617	34,568	26,895	11	840			
8. Clackmannan . . .	15,808	513	5,379	9	441	..	4,507	308	831	14	84	17	21	1,365	8,815	6,410	13	138			
9. Dumbarton . . .	51,415	174	7,123	1	127	6	8,228	2,459	1,871	30	254	23	21	1,107	17,649	10,817	67	56			
10. Dumfries . . .	260,212	76	53,657	16	3	5	42,219	3,432	17,007	628	1,809	24	53	22,443	83,527	109,817	78	133			
11. Edinburgh . . .	129,726	4,403	23,061	6	59	132	32,791	6,041	11,065	59	1,815	268	824	19,062	83,840	44,133	237	107			
12. Elgin . . .	101,144	711	12,650	628	20	30	36,103	1,770	15,394	80	26	348	17	17,525	88,110	9,076	54	228			
13. Fife . . .	265,364	9,043	21,290	39,814	893	1,137	72,165	15,319	24,046	60	609	608	114	40,765	64,748	76,852	203	631			
14. Forfar . . .	250,293	6,377	20,429	50,183	397	500	70,860	12,407	33,444	39	308	872	104	46,784	88,805	27,350	243	81			
15. Haddington . . .	112,104	4,662	16,835	17,432	90	388	38,491	8,229	15,309	246	772	152	292	25,090	27,765	29,373	361	30			
16. Inverness . . .	148,722	6	6,686	30,702	651	26	38,063	5,977	10,910	15	87	92	11	17,062	30,455	62,592	40	605			
17. Kinross . . .	35,966	316	13,749	28,370	38	365	41,882	2,327	17,739	8	69	400	105	20,652	43,694	9,098	81	10			
18. Kirkcubright . . .	102,114	83	121	26,214	10	32	26,494	1,441	11,634	162	1,858	20	23	8,504	11,816	13,071	23	14			
19. Lanark . . .	235,501	2,005	878	37,131	107	557	40,155	4,449	9,009	59	2,295	163	386	10,760	84,147	111,780	291	11			
20. Leith . . .	58,574	1,416	8,118	9,861	264	2	14,646	2,143	8,663	39	893	182	34	6,348	14,256	28,221	2,044	63			
21. Linlithgow . . .	26,380	..	4,494	8,085	5,750	87	8,992	3,806	4,073	13	8	30	7	4,530	10,226	2,183	8	16			
22. Nairn . . .	107,451	..	1,630	7,908	32	..	98,092	2,737	14,768	..	41	297	..	17,847	84,747	16,580	..	236			
23. Orkney . . .	58,315	16	431	7,660	98	..	9,471	2,841	1,540	..	648	34	..	1,500	41,905	..	..	351		
24. Shetland . . .	49,918	132	102	67,456	373	19	8,152	308	3,986	..	600	34	..	4,880	10,872	..	30	5			
25. Peebles . . .	837,081	4,319	13,192	11,124	115	105	12,878	8,185	2,364	117	739	270	81	42,768	102,903	102,843	1,360	156			
26. Perth . . .	141,364	1,364	31,234	641	6	20	43,838	7,231	15,981	115	314	423	36	5,973	94,243	47,806	128	134			
27. Renfrew . . .	141,951	360	19,301	27,978	21	426	41,018	1,183	30,783	98	970	205	33	23,201	53,757	64,265	42	362			
28. Ross & Cromarty . . .	20,887	2	301	4,904	1	..	5,115	187	2,564	2	167	171	131	9,823	11,987	..	52	26			
29. Roxburgh . . .	116,672	1,022	2,865	18,322	33	8	95,325	3,032	4,280	20	347	171	131	9,823	11,987	..	104	923			
30. Selkirk . . .	82,676	8	1,163	8,119	74	7	9,306	1,631	8,059	9	23	30	..	8,988	9,478	..	124	108			
31. Stirling . . .	154,931	215	727	32,601	24	174	33,642	1,450	14,898	472	973	37	..	17,269	66,571	..	16	174			
32. Sutherland . . .	4,891,799	41,136	973,110	5,234	11,613	994	1,246,127	131,364	456,924	3,306	15,917	8,192	2,501	618,208	1,599,787	1,414,453	5	5,954			
33. Wigtown . . .	7,390		
Total . . .	4,891,799	41,136	973,110	5,234	11,613	994	1,246,127	131,364	456,924	3,306	15,917	8,192	2,501	618,208	1,599,787	1,414,453	5	5,954			

TABLE No. 5.—ESTIMATED TOTAL PRODUCE OF HAY from Clover, Sainfoin, and Grasses under Rotation, also Total from Permanent Pasture, Acreage, and Estimated Average Yield per Acre in the Year 1902, compared with the Estimated Yield for the Years 1901 and 1900, and the AVERAGE of the Ten Years, 1892-1901, in each COUNTY of SCOTLAND.

COUNTIES.	FROM CLOVER, SAINFOIN, AND GRASSES.						FROM PERMANENT PASTURE.							
	Total Produce in 1902.	Average Yield per Acre.				Average of the Ten Years, 1892-1901.	Total Produce in 1902.	Average Yield per Acre.				Average of the Ten Years, 1892-1901.		
		Acres.	1902.		1901.			Acres.	1902.		1901.			
			Gwt.	1902.	1901.				Gwt.	1902.	1901.		Gwt.	1902.	1901.
Aberdeen	1,472,214	16,248	30.51	28.54	27.28	18,406	13.87	18.27	17.47	20.97	20.97			
Argyll	332,187	11,869	29.22	29.36	29.58	429,902	28.74	27.96	17.47	29.76	29.21			
Ayr	1,172,935	30,645	34.86	38.17	34.37	671,241	41.40	38.42	39.87	36.99	36.99			
Banff	296,401	10,810	28.75	30.06	27.00	5,261	21.21	17.36	16.59	20.36	20.36			
Berwick	356,843	10,192	35.01	31.50	30.88	41,498	1,408	24.98	26.89	26.44	26.44			
Bute	60,987	2,143	82.66	37.02	34.44	13,895	693	19.88	28.08	20.15	20.15			
Caithness	146,712	9,603	13.44	22.49	23.24	13,895	5.87	8.20	10.77	10.77	10.77			
Clackmannan	72,893	1,887	38.68	35.71	34.56	6,782	1,146	5.87	23.56	28.21	28.21			
Dumfries	275,040	7,107	38.70	43.23	37.69	12,652	477	38.17	39.54	40.04	40.04			
Dunbarton	458,717	15,635	28.23	32.90	26.86	56,183	18,183	27.60	38.67	38.77	38.77			
Dumfriesshire	564,789	13,545	40.59	41.53	36.11	56,183	35.04	30.80	31.88	33.77	33.77			
Edinburgh	867,195	25,689	32.55	27.44	26.17	7,374	263	23.85	20.15	21.07	21.07			
Highland	792,509	20,883	37.67	35.13	30.94	93,425	9,460	24.38	23.80	23.80	23.80			
Argyll and Bute	612,932	10,049	47.56	48.29	36.20	20,094	1,109	23.60	22.04	23.13	23.13			
Forfar	927,535	11,406	82.00	38.69	30.90	31,528	1,003	26.84	24.93	26.87	26.87			
Glasgow	237,535	11,406	94.00	51.78	39.64	112,320	4,077	22.57	24.67	16.10	16.10			
Inverness	384,616	12,919	29.77	28.70	26.89	5,890	199	17.04	19.64	16.00	16.00			
Kincardine	84,437	2,949	32.00	30.68	28.39	8,908	83.74	23.09	28.09	30.26	30.26			
Kirkcubright	265,771	9,534	27.88	25.58	27.49	38,463	80.03	21.88	29.09	25.15	25.15			
Leith	1,803,300	85,212	37.01	34.92	37.00	318,870	12,693	31.16	34.63	36.09	36.09			
Linlithgow	449,871	7,752	58.05	56.90	48.94	42,440	11,998	29.72	30.59	30.46	30.46			
Nairn	40,363	1,888	61.06	56.10	48.94	25,656	86	14.23	16.00	17.00	17.00			
Orkney	167,851	5,801	19.46	20.01	20.44	1,224	86	10.98	10.79	9.98	9.98			
Perth	68,274	2,457	32.85	32.34	30.44	7,310	819	10.98	10.79	9.98	9.98			
Perth and Kinross	1,013,500	31,838	38.63	38.59	38.80	41,772	1,107	37.73	34.46	29.48	29.48			
Perth	562,082	14,183	39.63	38.59	39.00	232,790	9,431	28.87	22.16	23.86	23.86			
Ross and Cromarty	230,203	8,483	17.38	15.98	19.11	242,725	4,983	40.20	46.28	46.10	46.10			
Roxburgh	834,804	6,960	37.31	35.18	31.72	189,011	5,783	7.15	7.19	7.42	7.42			
Saltire	89,168	1,162	34.00	30.48	28.54	94,977	81.92	27.81	27.19	27.19	27.19			
Shetland	11,094	1,796	16.49	16.49	16.16	40,048	1,489	32.00	29.99	30.00	30.00			
Shilling	408,584	13,151	37.53	36.49	33.95	17,726	1,016	14.80	15.94	16.04	16.04			
Shilling	408,584	13,151	37.53	36.49	33.95	17,726	1,016	14.80	15.94	16.04	16.04			
South Ayrshire	70,958	4,184	16.96	16.85	15.18	124,365	8,717	83.46	34.13	32.98	32.98			
Stirling	495,584	13,151	37.53	36.49	33.95	17,726	1,016	14.80	15.94	16.04	16.04			
Strathclyde	185,115	5,223	35.44	32.29	35.00	9,066	1,284	7.08	7.98	9.40	9.40			
Wigtown	18,878,813	417,896	33.64	31.87	31.73	2,967,753	131,521	27.97	31.44	28.74	28.74			
Total	18,878,813	417,896	33.64	31.87	31.73	2,967,753	131,521	27.97	31.44	28.74	28.74			

* This Acreage is less than that stated in some other Tables by 216 acres, which were originally returned for the county of Orkney as "Grass for Hay," but were subsequently stated to have been used for grazing.

TABLE NO. 6.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS IN EACH COUNTY OF SCOTLAND AS RETURNED ON JUNE 4, 1903.

COUNTIES.	HORSES (including Ponies).				CATTLE.				SHEEP.			
	Used solely for Agriculture, &c.	Unbroken Horses.			Total.	Cows and Heifers in Milk or in Calf.	Other Cattle.		Total.	1 Year Old and above.	Under 1 Year.	Total.
		1 Year and above.	Under 1 Year.	Under 1 Year.			2 Years and above.	Under 2 Years.				
1. Aberdeen	28,447	6,830	2,254		31,271	44,000	45,414	89,649	179,072	118,174	90,568	208,742
2. Argyll	4,422	1,161	485		6,078	22,917	12,114	27,568	49,679	76,507	208,403	891,349
3. Argyllshire	7,152	1,454	539		9,145	50,911	14,178	37,674	102,701	222,416	182,900	375,306
4. Banff	6,712	1,801	718		9,231	18,107	6,448	25,941	45,611	85,114	123,909	46,638
5. Berwick	4,131	673	226		5,116	2,809	7,180	5,762	18,861	163,116	163,511	317,004
6. Bute	961	199	60		1,150	2,625	1,460	9,713	9,713	23,441	16,283	49,686
7. Caithness	4,437	871	300		5,608	7,906	8,122	12,191	23,282	74,289	68,580	132,839
8. Clackmannan	554	120	61		728	1,400	834	1,514	3,518	8,627	6,719	14,346
9. Dumfriesshire	1,436	281	165		1,755	8,043	2,360	4,003	14,161	45,760	37,029	72,779
10. Dunfries	5,791	1,410	567		7,758	20,800	14,183	30,138	65,161	344,816	230,860	676,075
11. Edinburgh	8,913	468	163		9,474	12,200	3,424	1,858	20,458	100,870	76,341	183,220
12. Elgin	8,808	175	486		9,469	6,772	4,181	12,868	23,091	33,180	22,251	55,401
13. Fife	7,874	1,471	575		9,920	13,229	20,205	19,247	61,877	43,713	64,580	110,569
14. Forfar	8,493	1,694	358		9,545	13,745	21,857	20,701	55,393	91,819	64,580	155,670
15. Haddington	8,223	1,138	75		9,436	1,888	6,176	2,838	11,001	71,015	52,146	127,000
16. Inverness	7,105	683	276		8,064	22,269	6,772	22,601	51,232	32,179	187,662	669,181
17. Kinross	4,204	207	76		4,687	1,969	13,047	21,794	50,916	247,185	101,264	408,439
18. Kirkcubright	4,154	1,064	48		5,411	10,975	12,294	28,508	75,262	161,431	96,189	247,620
19. Lanark	6,784	1,329	491		8,454	89,460	8,215	4,664	12,951	11,849	7,880	22,079
20. Leith	1,674	451	135		2,260	5,075	8,215	3,235	5,886	11,024	5,237	16,801
21. Linlithgow	1,065	111	711		1,766	10,399	8,454	16,175	29,934	18,026	17,788	86,708
22. Nairn	5,911	1,047	711		7,669	8,215	8,501	6,200	18,408	82,961	60,621	183,552
23. Orkney	3,407	1,590	1,065		6,062	2,116	1,850	3,720	7,688	114,778	87,843	202,121
24. Shetland	881	132	60		1,073	2,116	1,850	3,720	7,688	114,778	87,843	202,121
25. Peebles	10,243	1,902	614		12,759	16,013	20,905	8,894	77,812	400,230	244,207	704,443
26. Perth	2,654	614	173		3,440	17,193	8,182	8,868	36,063	21,078	16,004	39,082
27. Renfrew	6,066	1,176	542		7,784	17,077	8,503	19,426	45,000	178,921	96,037	268,948
28. Ross and Cromarty	8,706	408	97		9,211	4,722	6,444	9,005	19,771	294,101	245,437	539,538
29. Roxburgh	303	59	19		671	1,268	877	1,608	3,153	102,006	82,094	184,090
30. Selkirk	3,570	581	301		4,752	12,180	8,707	18,479	34,420	74,861	49,275	124,130
31. Stirling	2,251	240	107		2,598	5,814	1,788	5,027	12,059	184,393	66,082	201,375
32. Sutherland	4,373	1,042	444		5,859	24,203	9,642	18,138	31,978	78,775	48,894	111,391
33. Wigton	151,643	31,423	12,465		200,530	437,418	275,817	634,011	1,247,246	4,418,863	2,808,542	7,227,395
Total	151,643	31,423	12,465		200,530	437,418	275,817	634,011	1,247,246	4,418,863	2,808,542	7,227,395

* Including Mares kept for breeding.

TABLE NO. 7.—QUANTITY AND VALUE OF CORN, &c., imported into the United Kingdom in the undermentioned Years.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1901.	1902.	1903.	1901.	1902.	1903.
Wheat from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia	2,541,500	6,540,457	17,176,802	885,908	2,140,906	5,800,304
Germany	594,700	239,910	310,175	207,691	79,122	105,554
Turkey	406,400	845,525	450,104	119,366	104,537	144,485
Roumania	512,100	2,362,453	3,140,727	188,738	768,703	1,055,012
United States—						
On the Atlantic	31,824,400	30,660,521	18,425,755	10,504,752	10,105,400	6,401,519
On the Pacific	8,641,900	12,643,040	5,753,071	2,680,759	4,380,321	2,041,010
Chile		231,446	238,044		54,009	83,623
Argentine Republic	8,080,400	4,815,165	14,120,455	2,670,355	1,463,061	4,099,833
British East Indies	3,341,500	8,841,586	17,057,542	1,085,440	2,988,008	5,051,510
Australia	5,487,700	4,174,753	26	1,840,532	1,433,126	10
New Zealand	1,883,100	156,626	204	448,975	53,841	46
Canada	6,691,710	9,527,375	10,803,941	2,216,049	3,191,024	3,737,957
Other countries	253,120	934,270	627,488	72,717	276,853	206,872
Total	69,708,530	81,002,227	68,180,634	23,081,372	27,079,823	20,940,545
Wheat and flour, from—						
Germany	34,300	16,208	37,022	15,415	7,339	17,481
France	534,570	713,935	577,109	232,454	287,258	238,508
Austria-Hungary	799,588	683,962	417,589	444,722	302,136	471,021
United States	18,999,882	15,587,217	16,223,394	8,695,249	7,217,060	7,617,615
Canada	1,358,100	1,433,213	2,637,395	628,611	669,983	1,253,241
Other countries	841,990	948,806	308,192	322,068	151,892	125,300
Total	22,576,430	19,886,341	20,601,191	10,341,519	8,925,617	9,722,806
Barley	21,873,430	25,200,837	26,548,078	6,168,012	7,131,712	7,219,314
Oats	22,470,070	10,857,167	10,281,914	6,317,719	5,041,323	1,203,928
Peas	2,042,711	2,035,110	1,820,833	747,168	740,128	690,737
Beans	1,868,560	2,065,593	1,785,202	629,881	708,659	594,630
Indian corn or maize	51,372,700	44,492,977	50,097,877	12,387,225	11,713,132	12,464,184
Indian corn meal		242,441	590,416	457,345	88,270	176,022
Oatmeal	840,335	612,402	729,087	546,132	480,241	537,415
Offals of corn and grain, including rice-meal . . . . .	..	3,306,489	2,616,223	..	724,073	535,579
Rice, rice-meal, and flour—						
From Brit. East Indies	5,281,875	1,945,735	..	1,786,052	661,491	..
From other countries	1,473,388	602,953	..	691,413	267,729	..
Rice, exclusive of rice-meal—						
From Brit. East Indies . . . . .	..	2,044,073	3,491,153	..	682,378	1,453,467
From other countries . . . . .	..	858,839	1,198,325	..	401,189	597,106
Other kinds of grain and corn	1,736,201	1,547,707	..	475,515	461,779	540,357
Other kinds of meal and flour . . . . .	..	207,563	..	..	77,593	35,870
Total of corn, &c. . . . .	..	..	..	63,654,333	65,188,032	68,772,650

Shown separately from 1st July 1902.

† Rice-meal is included with "Offals of Corn and Grain" from 1st July 1902.

TABLE NO. 8.—RETURN OF THE AVERAGE PRICES OF WOOL in the Years 1901 and 1902.

Years.	Australian.		South African.		English Fleeces.	
	Per lb.		Per lb.		Per lb.	
	s.	d.	s.	d.	s.	d.
1901	0	7½	0	7	0	11 10 0 0½
1902	0	7½	0	7½	0	5 11 0 0½

TABLE NO. 9.—QUANTITIES AND VALUES OF CORN, MEAT, FOOD PRODUCTS,
in the Year 1903, with the

[From Trade and

	Quantities.			Values.		
	1901.	1902.	1903.	1901.	1902.	1903.
ANIMALS, LIVING:—	No.	No.	No.	£	£	£
Cattle	495,685	419,483	522,546	8,840,664	7,814,753	9,209,122
Sheep and lambs	338,594	293,203	334,241	586,139	454,422	546,068
Swine . . . . .	..	..	..	..	..	..
Total value . . . . .	..	..	..	9,426,803	8,269,175	9,755,195
GRAIN, FLOUR, &c :—	Cwt.	Cwt.	Cwt.	£	£	£
Wheat	69,703,330	50,604,227	38,130,634	29,081,372	27,079,823	29,940,545
Wheat meal and flour . .	22,576,430	19,336,341	20,601,191	10,341,519	9,927,617	9,722,596
Barley	21,873,430	25,200,687	26,548,078	6,163,012	7,131,712	7,219,814
Oats	22,470,670	15,487,167	16,281,914	6,847,719	5,041,221	4,263,925
Peas	2,042,711	2,035,110	1,829,561	747,115	740,123	690,787
Beans	1,867,560	2,065,593	1,765,202	639,381	703,059	594,680
Maize or Indian corn . .	51,372,700	44,492,977	50,097,877	12,387,225	11,713,182	12,464,184
Maize-meal	1,038,026	242,641	390,416	457,345	88,270	176,622
Oatmeal	840,331	612,602	729,087	546,132	486,241	587,415
{Offals of corn and grain, including rice-meal }	..	3,464,469	2,616,223	..	734,973	535,879
{Rice, rice meal, and flour— From British East Indies }	7,291,575	1,945,735	..	1,786,062	661,491	..
From other countries . .	1,473,383	602,953	..	601,413	267,720	..
{Rice, exclusive of rice- meal— From British East Indies }	..	2,044,678	3,491,153	..	683,378	1,433,467
From other countries . .	..	838,339	1,198,325	..	401,189	597,106
Other kinds of grain & corn }	1,736,201	1,547,707	1,730,625	461,779	540,877	..
Other kinds of meal and flour }	..	207,863	87,493	473,545	77,598	35,870
Total value . . . . .	..	..	..	63,654,023	65,453,032	63,772,650
MEAT:—	Cwt.	Cwt.	Cwt.	£	£	£
Beef, salted	204,396	169,374	173,892	267,356	244,002	245,604
" fresh	4,508,746	3,707,387	4,159,606	3,906,339	7,905,064	8,866,141
Mutton, fresh	3,666,239	3,654,549	4,016,822	6,568,080	6,914,911	7,326,062
Bacon	5,772,345	5,059,704	5,156,988	13,590,176	13,426,967	13,610,110
Hams	1,560,670	1,482,287	1,141,332	4,528,888	3,565,902	3,142,574
Pork, salted (not lard or hams) }	247,047	205,359	237,583	324,168	305,584	319,264
Pork, fresh	791,509	655,376	705,844	1,715,683	1,446,145	1,555,152
Meat, unenumerated— salted or fresh }	610,271	653,023	663,261	1,120,447	1,199,110	1,206,163
Meat preserved otherwise than by salting }	769,345	911,856	767,557	2,282,305	2,786,194	2,135,526
Rabbits	891,867	451,457	475,645	648,326	734,326	728,561
Total of dead meat . . .	13,764,431	16,971,022	17,498,180	39,982,218	38,821,205	39,440,097
DAIRY PRODUCE:—	Cwt.	Cwt.	Cwt.	£	£	£
Butter	3,762,890	3,974,933	4,060,684	19,297,996	20,526,690	20,798,706
Margarine	962,127	966,170	883,198	2,556,679	2,569,503	2,816,874
Cheese	2,586,337	2,546,212	2,694,211	6,227,185	6,412,062	7,054,306
Total	7,231,354	7,487,315	7,638,191	28,081,810	30,508,195	30,169,886

* Grain, Flour, Starch, &c., became subject to duty on and after 15th April 1902.

† Shown separately from 1st July 1902.

‡ Rice-meal is included with "Offals of Corn and Grain" from 1st July 1902.

AND ARTICLES AFFECTING AGRICULTURE, imported into the United Kingdom
Corresponding Figures for 1901 and 1902.

Navigation Returns.]

	Quantities.			Values.		
	1901.	1902.	1903.	1901.	1902.	1903.
POULTRY, &c. :—						
Poultry and game, alive or dead	..	..	..	£ 980,737	£ 1,059,044	£ 1,203,086
Eggs	Gt. Hunds. 17,071,767	Gt. Hunds. 18,066,795	Gt. Hunds. 19,848,897	5,495,767	6,308,985	6,617,619
Total value . . . . .	..	..	..	6,476,524	7,368,029	7,820,705
FRUIT, VEGETABLES, &c. :—						
Apples	Cwt. 1,880,210	Cwt. 2,843,517	Cwt. 4,568,418	£ 1,182,782	£ 1,923,474	£ 2,781,348
Cherries	212,683	166,359	110,192	213,585	216,421	187,142
Plums	268,700	511,136	596,182	243,705	515,059	622,948
Pears	348,866	491,906	271,483	296,411	439,586	326,468
Grapes	679,885	632,932	687,938	694,942	676,002	717,830
Oranges	5,281,657	6,518,107	6,176,780	2,119,728	2,368,708	2,275,480
Lemons	1,071,534	1,003,208	973,318	484,514	417,152	406,728
Unenumerated	535,247	500,679	688,876	302,018	308,998	449,212
Onions	7,395,418	7,605,489	8,619,719	869,897	990,942	1,003,026
Potatoes	7,076,728	5,609,090	9,150,302	1,851,587	1,589,482	2,602,904
Vegetables, unenumerated (raw)	..	..	..	389,829	468,411	396,057
Hops	116,042	191,324	113,998	461,855	798,586	578,789
Total value . . . . .	..	..	..	9,059,848	10,712,711	12,328,777
OTHER ARTICLES :—						
Lard	Cwt. 1,966,256	Cwt. 1,650,830	Cwt. 1,732,715	£ 4,087,680	£ 4,118,992	£ 3,870,849
Wool, sheep and lambs'	686,956,308	687,129,783	599,509,782	21,504,577	10,924,255	20,622,523
Wood and timber— Hewn (pit-prop. or pit-wood)	Loads. 2,772,895	Loads. 2,810,724	Loads. 3,237,515	5,450,052	5,435,204	6,379,250
Sawn or split, planed or dressed	6,281,000	6,676,736	6,741,107	16,319,014	17,172,422	18,187,416
Staves	140,064	119,992	129,042	730,521	668,830	570,859
Oilseed-cake	Tons. 379,599	Tons. 337,667	Tons. 367,601	2,413,646	2,472,938	2,165,485
Seeds— Clover and grass	Cwt. 281,120	Cwt. 337,802	Cwt. 453,048	611,618	740,387	1,008,772
Cotton	Tons. 437,149	Tons. 550,620	Tons. 537,431	2,705,597	3,285,650	2,984,096
Flax and linseed	Qrs. 1,684,832	Qrs. 1,818,820	Qrs. 2,186,666	4,263,081	4,486,997	4,181,965
Rape	161,329	228,278	303,296	298,426	385,708	417,671
Bones (whether burnt or not)	Tons. 57,748	Tons. 58,973	Tons. 52,996	220,024	224,128	282,690
Guano	22,880	29,293	32,801	104,909	186,926	180,891
Cotton, raw	Cwt. 16,336,697	Cwt. 16,220,874	Cwt. 16,009,322	41,970,589	41,149,202	44,835,822
Hemp	Tons. 136,215	Tons. 115,069	Tons. 117,875	4,122,219	3,913,094	3,581,968
Flax	75,565	73,420	94,701	3,070,000	2,944,390	3,675,684
Hides untanned— Dry	Cwt. 853,087	Cwt. 288,334	Cwt. 291,430	987,132	845,484	877,368
Wet	787,175	651,198	498,781	1,782,779	1,595,109	1,230,748
Petroleum	Gallons. 258,784,746	Gallons. 284,809,710	Gallons. 285,871,233	5,070,702	5,193,582	5,295,383

TABLE NO. 10.—QUANTITY AND VALUE OF DEAD MEAT imported into the United Kingdom in the undermentioned Years.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1901.	1902.	1903.	1901.	1902.	1903.
	Cwt.	Cwt.	Cwt.	£	£	£
BACON, from—						
Denmark	1,060,909	1,255,627	1,486,101	3,234,466	3,749,108	4,294,017
Canada	398,697	462,487	665,249	921,509	1,203,280	1,601,687
United States	4,244,829	3,283,855	2,893,507	9,255,881	8,239,522	7,370,928
Other countries	88,418	87,735	102,131	178,360	235,057	262,508
Total	5,772,348	5,089,704	5,156,988	13,590,176	13,426,967	13,619,140
BEER (salted), from—						
United States	192,000	143,994	165,176	246,927	227,283	232,298
Other countries	12,894	9,580	8,516	20,429	16,719	13,812
Total	204,896	153,574	173,692	267,356	244,002	245,605
BEEF (fresh), from—						
United States	3,180,291	2,290,465	2,893,020	6,761,537	5,204,057	5,739,750
Argentine Republic . .	771,920	923,748	1,152,211	1,218,246	1,723,652	2,057,669
Australia	243,348	65,860	77,556	378,701	115,916	122,511
New Zealand	228,126	237,257	159,830	366,595	417,190	271,247
Other countries	85,052	190,037	75,489	181,710	444,240	175,964
Total	4,508,745	3,707,887	4,159,606	8,906,839	7,905,064	8,868,141
HAMS, from—						
Canada	125,867	163,980	197,497	304,822	420,819	524,542
United States	1,730,886	1,312,779	989,169	4,306,516	3,422,004	2,602,654
Other countries	4,387	5,673	4,666	18,750	10,579	15,378
Total	1,860,670	1,452,287	1,141,332	4,528,388	3,855,402	3,142,574
MEAT (unenumerated, salted or fresh), from—						
Holland	234,790	291,050	269,541	616,411	628,619	571,762
United States	174,880	163,348	179,212	275,913	250,900	283,766
Other countries	150,651	200,616	214,508	228,132	315,591	350,624
Total	610,271	655,023	663,261	1,120,447	1,199,110	1,206,152
MEAT, preserved otherwise than by salting—						
Beef	464,727	578,426	472,600	1,259,898	1,710,953	1,511,846
Mutton	64,554	85,496	49,151	168,142	206,562	106,873
Other sorts	239,737	247,134	245,794	524,269	569,249	517,607
Total	769,348	911,856	767,567	2,252,305	2,786,194	2,435,826
MUTTON (fresh), from—						
Holland	316,385	843,759	257,521	711,550	780,720	580,673
Australia	518,630	274,134	191,260	952,811	543,570	365,384
New Zealand	1,498,217	1,685,037	2,035,434	2,919,441	3,218,720	4,163,260
Argentine Republic . .	1,371,654	1,352,501	1,485,770	1,960,590	2,278,027	2,603,931
Other countries	13,434	49,168	56,626	33,679	99,074	122,805
Total	3,608,229	3,659,500	4,016,623	6,598,080	6,914,911	7,620,062
PORK (salted, not Bacon or Hams), from—						
United States	137,680	105,416	90,840	207,856	187,132	153,818
Other countries	109,367	99,843	146,784	116,312	115,453	160,946
Total	247,047	205,259	237,583	324,168	302,585	314,764
PORK (fresh), from—						
Holland	377,061	353,398	527,209	800,729	772,080	1,122,202
Belgium	40,482	34,656	39,745	86,122	53,732	97,960
United States	348,935	252,421	182,695	762,908	572,328	319,684
Other countries	25,081	14,901	6,185	53,789	38,006	15,626
Total	791,599	655,376	705,844	1,715,633	1,446,145	1,556,482
RABBITS (dead), from—						
Belgium	72,368	77,555	68,716	205,925	226,300	197,950
Australia	145,582	190,974	249,864	194,122	246,795	255,718
New Zealand	143,875	144,063	134,171	175,858	173,032	160,757
Other countries	80,347	32,865	28,894	84,026	87,899	80,456
Total	391,867	451,457	475,645	648,826	734,326	728,881
Total of dead meat . .	13,764,431	16,971,022	17,493,130	39,982,318	38,821,205	39,440,097

TABLE NO. 11.—QUANTITIES AND VALUES OF BUTTER, MARGARINE, CHEESE, AND EGGS imported into the United Kingdom in each Year from 1901 to 1906 inclusive.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1901.	1902.	1903.	1901.	1902.	1903.
BUTTER from—	Cwt.	Cwt.	Cwt.	£	£	£
Russia . . .	378,452	490,091	484,328	1,655,552	2,196,234	2,190,560
Sweden . . .	180,212	191,591	212,232	938,889	995,585	1,108,980
Denmark . . .	1,597,186	1,708,032	1,771,654	8,950,497	9,302,362	9,572,189
Germany . . .	26,983	26,375	12,506	150,206	145,399	65,165
Holland . . .	298,912	393,261	343,725	1,511,564	1,973,930	1,718,092
France . . .	311,601	114,240	451,088	1,704,128	2,233,122	2,351,401
New S. Wales . . .	59,597	17,621	20,371	293,917	88,256	99,629
Queensland . . .	53	20	756	260	104	3,725
Victoria . . .	186,141	62,519	93,177	921,505	312,578	469,168
New Zealand . . .	167,343	157,993	249,879	819,534	781,872	1,245,022
Canada . . .	215,588	235,765	185,464	1,008,002	1,347,345	866,249
United States . . .	150,126	54,458	12,405	689,164	252,874	190,678
Other countries . . .	130,696	177,987	185,069	654,378	896,776	916,998
Total . . .	3,702,890	3,974,933	4,060,654	19,297,396	20,526,690	20,798,706
MARGARINE from—	Cwt.	Cwt.	Cwt.	£	£	£
Norway . . .	7,787	6,067	5,210	20,553	14,918	12,987
Holland . . .	908,961	911,323	843,036	2,396,630	2,409,257	2,188,497
France . . .	30,710	34,731	28,795	107,217	117,853	99,751
Other countries . . .	14,666	11,049	6,152	33,279	27,475	15,119
Total . . .	962,127	966,170	883,193	2,556,679	2,569,503	2,316,354
CHEESE from—	Cwt.	Cwt.	Cwt.	£	£	£
Holland . . .	315,923	284,020	302,362	747,013	668,308	706,463
France . . .	26,833	36,801	35,991	83,580	113,611	113,495
Australia . . .	149	7		719	18	
New Zealand . . .	79,084	51,875	56,339	193,149	131,086	168,071
Canada . . .	1,547,739	1,709,565	1,848,152	3,697,660	4,301,859	4,823,090
United States . . .	540,102	390,479	360,916	1,274,061	962,112	953,215
Other countries . . .	76,997	73,465	90,151	230,653	235,058	249,971
Total . . .	2,596,837	2,546,212	2,694,214	6,227,135	6,412,002	7,054,805
EGGS from—	Great Hundreds.	Great Hundreds.	Great Hundreds.	£	£	£
Russia . . .	4,492,110	5,339,045	6,802,773	1,207,471	1,509,751	1,866,421
Denmark . . .	3,019,414	3,518,212	3,851,557	1,160,948	1,366,073	1,648,367
Germany . . .	2,971,777	3,931,280	3,037,751	895,624	1,260,871	994,817
Belgium . . .	2,576,642	2,627,457	2,291,262	805,241	827,914	725,680
France . . .	1,805,196	1,680,433	1,601,940	696,125	717,474	670,104
Canada . . .	704,083	517,822	557,080	255,956	209,316	218,571
Other countries . . .	1,603,595	1,352,546	1,656,534	474,399	417,583	493,659
Total . . .	17,071,767	18,966,795	19,848,897	5,495,767	6,308,985	6,617,619

TABLE NO. 12.—PRICES OF LIVE STOCK IN 1900, 1901, AND 1902, as returned under the Markets and Fairs (Weighing of Cattle) Act, 1891.

[From Journal of the Board of Agriculture.]

NUMBER OF ANIMALS REPORTED AS ENTERING THE 19 SCHEDULED PLACES IN GREAT BRITAIN, TOGETHER WITH THE NUMBERS WEIGHED AND THE NUMBERS PRICED.

ANIMALS.	1900.	1901.	1902.
CATTLE :—	No	No	No.
Entering markets	1,187,603	1,161,516	1,302,601
Weighed	141,611	156,289	184,499
Prices returned	124,648	131,792	145,996
Prices returned with breed and quality distinguished }	104,318	109,590	121,453
SHEEP :—			
Entering markets	4,325,613	4,314,232	4,505,045
Weighed	43,581	39,371	42,832
Prices returned with breed and quality distinguished }	36,312	32,439	34,695
SWINE :—			
Entering markets	442,216	383,875	414,351
Weighed	2,196	2,167	2,722
Prices returned with quality distinguished }	2,120	2,161	2,585

CALCULATED AVERAGE PRICE PER LIVE CWT. IN TWELVE SELECTED PLACES.

(Obtained by dividing the total price by the total weight of the weighed animals of all descriptions in each of the three qualities or grades.)

PLACES.	Inferior or third quality.		Good or second quality.		Prime or first quality.	
	1901.	1902.	1901.	1902.	1901.	1902.
	Per cwt s. d.	Per cwt. s. d.	Per cwt. s. d.	Per cwt s. d.	Per cwt s. d.	Per cwt s. d.
ENGLAND :—						
Carlisle	27 8	27 6	31 2	31 0	34 8	35 6
Leeds	28 0	28 .	29 6	33 2	34 2	36 4
Liverpool	26 4	28 2	30 4	32 0	34 2	36 2
London	29 8	29 2	34 6	36 2	38 4	40 6
Newcastle . . . .	...	...	33 0	34 4	36 10	39 8
Shrewsbury	29 4	29 6	33 2	33 4	35 8	37 4
SCOTLAND :—						
Aberdeen	26 0	26 8	34 0	35 8	36 4	39 0
Dundee	26 2	26 2	34 4	36 0	37 0	39 8
Edinburgh . . . .	...	...	35 2	37 2	37 10	40 0
Falkirk	31 10	31 4	34 10	35 0	37 0	38 4
Glasgow	33 10	35 6	34 6	36 10	36 0	38 4
Perth	33 6	31 4	35 6	35 2	37 10	39 0

TABLE NO. 13.—NUMBER AND VALUE OF LIVE CATTLE, SHEEP, AND SWINE imported into the United Kingdom in the undermentioned Years. [*From Trade and Navigation Returns.*]

	Number.			Value.		
	1901.	1902.	1903.	1901.	1902.	1903.
CATTLE, from—				£	£	£
Channel Islands . . .	1,720	1,880	1,721	81,650	25,574	81,085
Canada	88,211	98,674	190,615	1,484,860	1,044,478	3,315,776
United States . . .	405,704	324,481	801,757	7,324,154	6,144,646	5,899,248
Argentine Republic .	..	..	27,817	..	..	455,071
Other countries . .	..	3	486	..	55	7,397
Total	495,635	419,488	522,546	8,840,664	7,814,758	9,309,122
SHEEP AND LAMBS, from—						
Canada	68,010	55,033	83,291	99,506	86,501	129,045
United States . . .	300,152	233,227	171,386	463,519	361,736	264,416
Argentine Republic .	..	..	82,841	..	..	184,289
Other countries . .	15,482	4,043	16,623	23,114	6,185	18,368
Total	383,594	292,203	354,241	586,139	454,422	546,068
SWINE (not separately enumerated) }	..	..	..	..	..	..
TOTAL VALUE OF ANIMALS LIVING }	..	..	..	9,426,808	8,269,175	9,755,185

TABLE NO. 14.—NUMBER OF HORSES, CATTLE, SHEEP, AND PIGS imported into Great Britain from Ireland in each of the Years 1897-1903.

	1897.	1898.	1899.	1900.	1901.	1902.	1903.
HORSES:—							
Stallions	153	150	122	108	194	322	205
Mares	17,590	18,200	19,538	16,320	11,467	11,143	12,887
Geldings	20,679	20,454	22,562	10,183	13,946	13,895	11,737
Total	38,422	38,804	42,222	26,606	25,607	25,200	24,729
CATTLE: Oxen, Bulls, and Cows:—							
Fat	259,173	278,770	278,220	275,450	261,690	306,892	240,897
Store	110,302	460,903	443,456	427,591	344,454	556,554	556,506
Other cattle . . .	5,043	4,101	6,219	7,442	6,269	10,034	6,724
Calves	62,494	59,588	45,099	34,736	29,725	85,161	87,526
Total	746,012	803,362	772,994	745,519	642,638	959,241	997,645
SHEEP:—							
Sheep	435,709	449,558	452,214	478,081	484,516	599,319	444,702
Lambs	368,306	383,900	423,664	384,182	355,809	456,483	380,917
Total	804,515	833,458	875,878	862,263	840,325	1,055,802	825,619
PIGS:—							
Fat	653,459	556,728	650,850	673,847	559,282	603,108	541,001
Store	41,848	82,062	37,710	41,355	36,897	34,564	28,319
Total	695,307	638,785	688,560	715,202	596,129	637,672	569,320

EDINBURGH CORN-MARKET GRAIN TABLES for WHEAT, BARLEY, OATS, and BEANS, showing the Quantity offered for Sale, the Quantity Sold, the Highest, Lowest, and Average Prices; also the Bushel-weights of the Highest and Lowest Prices of each kind of Grain for every Market-day, likewise the Results for every Month, and the final Result for the year 1903.

WHEAT.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for			
						Highest Price.		Lowest Price.	
1903	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.	lb. lb.	lb. lb.	lb. lb.
Jan.									
7	212	212	28 0	22 0	24 9		63		57
14	274	274	26 9	21 0	24 11		63		60
21	257	232	27 0	20 3	25 5	60½	61½		55½
28	150	150	27 0	25 3	26 0		61½		59½
	89½	868	27 0	23 1	25 3				
Feb.									
4	95	370	28 6	24 6	26 7		63		58½
11	291	253	28 0	24 9	26 5		62		63
18	943	819	28 0	24 0	27 1	62	61	50½	60½
25	559	455	28 0	24 0	27 1	62	63		63
	2,187	1,905	28 1	24 3	26 11				
March									
4	420	278	27 6	25 0	26 3		62	58½	59½
11	738	683	28 6	24 0	26 1		63		60½
18	547	402	28 0	22 9	26 3		63		60
25	228	149	27 0	23 0	25 7		62		59½
	1,923	1,512	27 11	24 0	26 1				
April									
1	307	214	27 6	23 9	25 2		63		60½
8	477	264	26 9	24 0	25 11		62		59½
15	849	313	27 0	22 9	25 8		63		58½
22	151	91	27 3	24 0	26 3		62		58½
29	496	446	27 9	24 0	26 11		63		59½
	1,779	1,325	27 5	23 5	26 1				
May									
6	1,044	967	28 0	24 6	26 8		63		60½
13	371	304	27 6	25 9	27 4	62	63		59½
20	1,187	547	28 0	23 6	26 0		63	59½	60
27	432	392	27 6	24 0	26 3		61		60½
	1,031	1,510	27 9	23 10	26 5				
June									
3	705	759	28 0	25 3	26 2		63		60½
10	1,033	1,003	27 9	25 0	26 10		62	58½	61
17	1,935	1,317	28 0	23 0	26 7		63		59½
24	2,037	2,343	27 6	25 0	26 4		63	59½	61
	6,360	5,222	27 4	24 10	26 6				
July									
1	1,005	1,275	28 6	21 6	26 8		64½		58
8	1,110	1,602	28 6	23 0	26 8		63	58	58½
15	371	437	27 0	24 6	26 4	62	63		61½
22	540	473	28 0	24 0	25 11		63	59½	62
29	942	577	29 0	24 0	27 1		63		58½
	4,785	3,789	27 8	24 10	26 7				

WHEAT—continued.

Date	Quantity offered for Sale	Quantity Sold	Highest Price	Lowest Price	Average Price	Table of Bushel weights for			
						Highest Price		Lowest Price	
1908	Imp qr	Imp qr	s d	s d	s d	lb	lb	lb	lb
Aug									
5	1 027	1 482	29 6	26 0	27 1	63		60	60½
12	1 647	888	27 0	26 0	27 9	64		64	63
19	1 360	862	29 6	6 6	28 4	63		60½	62
26	1 182	575	29 3	20 6	28 2	62			61½
	5 819	3,807	29 5	26 3	27 11				
Sept									
2	589	430	27 1	26 0	28 4	64		59½	
9	354	54	27 0	24 6	28 2	63		57½	
16	490	70	29 0		29 0	63			
23	240	150	29 6	26 3	28 2	63		53½	
30	795	173	30 0	8 3	28 8	61½		61½	
	1 498	1 087	29 9	26 4	28 4				
Oct									
7	201	172	32 0	27 6	27 0	63		63	
14	122	27	30 0	27 0	29 8	63		61	
21	640	344	33 0	25 0	28 2	68		60½	
28	683	240	40 0	25 6	29 6	61		51½	
	1 601	783	33 3	26 6	28 10				
Nov									
4	604	279	36 0	26 1	31 7	63		61	
11	810	404	47 0	28 6	30 1	63		60½	
18	701	35	30 0	27 0	30 1	68		61½	
25	884	4 5	37 6	26 6	28 9	62½		55½	60
	3 079	1 59	3 8	26 7	30 0				
Dec									
2	565	08	9 0	27 0	28 4	62	63	62	
9	527	332	30 0	26 6	26 0	63	63½	61	62
16	344	259	30 0	18 0	26 6	62½			56
23	256	197	31 6	26 6	28 0	63		59	62
30	410	340	30 9	27 3	29 0	65			60½
	2 077	1 482	29 11	26 0	28 1				
Result for year	37 483	25 652	28 5	24 11	27 1				

BARLEY

1908							
Jan							
1	2 212	1 705	31 6	18 9	25 5	56	49
14	2 087	1 270	31 6	20 0	25 2	50	51½
21	3 040	1 630	30 0	17 9	24 11	56	52½
26	2 495	1 444	27 1	13 6	24 5	56	53½
	15 774	5 564	29 8	18 8	25 0		
Feb							
4	1 727	1 089	30 3	17 6	27 7	55	50½
11	2 009	91	31 6	22 6	26 6	56	54½
18	3 387	1 342	30 1	20 0	27 7	56	57½
25	2 221	759	31 6	19 6	28 1	56	58½
	9 335	3 945	30 6	20 1	24 8		

BARLEY—continued.

Date	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel- weights for	
						Highest Price.	Lowest Price.
1903	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.	lb. lb.
March							
4	2,250	505	25 0	19 0	21 8	55	51½ 54
11	2,477	1,080	30 0	17 6	22 4	58	54
18	2,007	855	26 6	19 0	23 1	55	53½
26	1,505	538	27 0	19 6	23 8	56	55
	8,289	2,929	26 7	18 10	22 6		
April							
1	1,506	692	27 0	18 0	23 0	55	55
8	561	218	27 0	22 0	23 11	56	54½
15	770	451	26 6	19 0	23 5	56	58
22	541	446	26 0	21 0	23 1	54	55
29	730	390	27 0	20 0	23 5	55	54
	4,408	2,137	26 9	20 0	23 3		
May							
6	1,033	642	26 6	19 6	21 10	56	54
13	1,106	557	24 6	18 6	21 11	55	52
20	786	415	23 6	20 0	21 10	56 56½	54 54½
27							
	2,925	1,614	24 1	19 8	21 10		
June							
3	477	420	23 0	20 0	22 4	55	54
10	438	155	24 0	20 6	22 1	55	52½ 55
17	284	195	23 0	22 0	22 8	56	55
24	211	120	21 6	19 8	20 10	55½	54
	1,355	890	22 10	21 8	22 1		
July							
1	748	380	24 0	20 0	22 8	57	55
8	367	124	22 3	20 0	21 8	55½	52½
15	85	45	22 0	19 6	21 5	56	55
22	188	40	24 6	.	24 6	55	..
29	60	40	19 6	..	14 6	53	..
	1,348	609	22 4	14 11	21 11		
Aug.							
5	42	30	21 0	20 0	20 4	55	54
12	236	11	21 0	..	21 0	56	..
19	15	..	..	..	..	..	..
26	45	..	..	..	..	..	..
	388	41	21 1	20 0	20 6		
Sept.							
2	532	87	24 0	21 0	23 6	56	56
9	736	476	27 0	20 0	23 7	56	54½
16	1,568	1,193	27 0	20 0	24 0	55 55½	54
23	1,956	1,519	27 0	18 0	24 7	56	54
30	2,558	1,773	29 9	18 0	23 11	56	52½
	7,340	4,978	27 1	20 1	24 1		
Oct.							
7	952	703	29 0	10 6	23 6	56	53
14	615	681	30 0	18 0	24 0	56	52½
21	1,114	876	28 0	20 0	24 10	55	55
28	888	707	32 0	20 0	26 5	56	53
	3,969	3,027	30 1	19 7	24 9		

BARLEY—continued.

Date.	Quantity offered for Sale.	Quantity Sold	Highest Price.	Lowest Price.	Average Price.	Table of Bushel-weights for			
						Highest Price.		Lowest Price.	
1903	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb.	lb.	lb.	lb.
Nov.									
4	1,180	688	29 6	20 6	26 7	56		55	
11	1,214	670	31 0	20 6	25 6	56		53	
18	2,019	1,111	30 6	19 0	25 11	56		54	
25	2,212	1,141	31 0	20 9	25 7	56		54	
	7,175	3,555	30 6	20 5	25 10				
Dec.									
2	2,490	1,470	29 0	18 0	24 0	56 ¹	54	55	
9	2,521	1,382	28 0	13 0	24 3	55 ¹		54	
16	2,578	1,212	29 0	11 0	23 0	56		49	
23	2,200	1,324	26 6	13 0	22 5	55		49	
30	2,159	929	28 9	12 6	23 10	56		51 ¹	
	11,960	6,217	28 0	13 9	23 6				
Result for year	68,272	35,509	27 1	19 4	24 1				

OATS.

1903								
Jan.								
7	2,209	1,505	25 0	17 0	20 5	44 ¹	45	42
14	1,966	1,345	23 0	17 3	20 0	44 ¹		42
21	1,925	1,226	27 0	17 0	20 5	44 ¹	41	42
28	2,053	1,387	26 0	16 9	20 4	44	45	39 ¹
	8,753	5,963	26 1	17 1	20 4			
Feb.								
4	2,988	1,615	28 0	17 6	20 10	45 ¹	41	41 ¹
11	3,245	1,686	26 0	16 0	20 11	45 ¹		39 ¹
18	2,098	1,370	26 0	18 0	21 9	43	45	42
25	2,687	895	26 0	15 0	20 7	44 ¹		41
	11,866	5,566	26 8	16 6	21 1			
March								
4	1,366	1,272	29 6	15 6	21 1	44 ¹		41
11	3,012	1,579	30 0	15 0	21 6	44 ¹		41
18	3,220	1,548	28 0	17 3	20 5	44 ¹	46	42
25	3,220	1,500	27 6	17 9	20 11	45 ¹		42
	14,198	6,199	27 1	16 3	21 1			
April								
1	2,405	1,026	28 0	17 3	20 3	45 ¹		42
8	2,389	1,174	27 0	17 0	20 5	44 ¹		41
15	1,352	819	23 6	15 0	20 5	44 ¹	45 ¹	42
22	1,226	1,173	24 3	18 3	21 1	45 ¹		42
29	1,950	1,017	24 6	18 6	21 1	45		41 ¹
	9,955	5,209	24 3	17 11	20 9			
May								
6	2,017	1,057	25 6	19 3	22 0	44 ¹		42 ¹
13	1,048	577	23 4	17 6	21 1	44		41
20	2,477	824	24 6	17 6	20 8	44 ¹		40
27	1,843	628	23 0	19 0	21 0	44 ¹		41
	7,980	3,081	24 5	18 0	21 3			

OATS—continued.

Date.	Quantity offered for Sale	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel weights for	
						Highest Price	Lowest Price.
1903	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb	lb. lb
June							
3	2,132	851	24 1½	19 6	21 3	44½	42
10	2,257	1,261	23 0	19 6	21 0	45½	41
17	2,090	1,081	23 0	17 9	20 6	44½	42
24	1,455	786	23 0	19 0	21 3	44½	42
	7,954	3,979	23 3	19 1	21 0		
July							
1	1,935	1,450	23 7	17 0	20 10	45½	40½
5	1,954	1,17	23 0	18 3	20 6	44½	42
15	1,664	1,107	22 0	16 6	19 10	44	40
22	1,842	571	22 6	15 3	20 0	45	42
29	1,862	751	23 3	18 0	21 2	44½	42
	8,462	4,576	22 11	17 5	20 6		
Aug.							
5	1,652	1,104	23 6	18 0	21 3		42
12	1,641	1,212	23 0	18 6	21 3	44½ 45	41½
19	1,062	714	23 6	18 3	21 5	44½	43
26	1,935	1,133	23 6	19 0	21 6	44½	42 43
	6,320	4,163	23 4	18 6	21 6		
Sept.							
2	1,861	1,221	25 0	19 0	21 9	43½	42
9	1,829	1,460	24 6	19 6	22 2	45½	42
16	3,694	2,561	24 6	19 3	21 10	45½	42
23	2,881	1,633	22 9	19 3	20 10	44½	42
30	1,805	1,103	22 0	16 0	20 8	44	42
	12,070	7,983	24 3	18 10	21 6		
Oct							
7	1,404	1,203	23 6	15 3	21 0	44½	42
14	1,649	1,861	25 0	19 6	22 4	44½	41½
21	2,416	2,136	25 3	17 6	22 5	44½	40
28	3,167	1,632	25 6	18 0	23 0	43½ 44½	39½
	8,636	6,237	25 1	18 1	22		
Nov.							
4	2,280	1,321	24 9	12 6	22 2	41½	42
11	2,506	1,290	25 0	10 0	21 10	44	37½
18	3,306	1,200	25 0	11 6	21 8	44½ 45	42½
25	3,751	1,715	24 6	12 0	21 5	44½	34
	10,827	5,576	24 11	12 4	21 9		
Dec.							
2	2,967	1,246	24 6	12 0	20 10	45½	38½
9	2,770	1,530	24 3	13 6	20 7	45	42
16	3,752	1,536	23 4	11 0	20 6	44½	40
23	2,473	1,517	25 0	10 6	20 3	45	39
30	2,340	1,225	23 0	13 6	19 10	44½	41½
	14,962	7,041	24 3	12 0	20 5		
Result for year	121,593	65,575	24 5	17 3	21 1		

BEANS.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel- weights for			
						Highest Price.		Lowest Price.	
	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.		lb. lb.	
1903 Jan.									
7	..	..	..	..	..	..		..
14	16	..	..	..	..	..		..
21	50	10	31 0	..	31 0	62		..	
28	50	80	33 0	..	33 0	63		..	
	140	40	32 6		32 6				
Feb.									
4	75	20	31 0	..	31 0	63		..	
11	85	35	33 0	32 0	32 3	64		63	
18	53	..	..	..	..	..		..
25	140	57	35 0	31 9	32 5	63		64	
	353	112	32 2	31 11	32 2				
March									
4	130	07	33 0	28 6	30 10	63		60½	
11	140	05	34 0	32 0	33 0	65½		64	
18	144	17	35 0	32 0	32 0	65½		63	
25	118	..	..	..	..	..		..
	532	179	31 8	31 8	31 9				
April									
1	80	56	34 0	28 9	30 3	65½		61½	
8	39	9	30 6	..	30 6	63½		..	
15	20	..	..	..	..	..		..
22	15	..	..	..	..	..		..
29	..	..	..	..	..	..		..
	154	65	31 9	29 9	30 4				
May									
6	..	..	..	..	..	..		..
13	..	..	..	..	..	..		..
20	..	..	..	..	..	..		..
27	..	..	..	..	..	..		..
				
June									
3	..	..	..	..	..	..		..
10	..	..	..	..	..	..		..
17	..	..	..	..	..	..		..
24	..	..	..	..	..	..		..
				
July									
1	..	..	..	..	..	..		..
8	..	..	..	..	..	..		..
15	..	..	..	..	..	..		..
22	..	..	..	..	..	..		..
29	..	..	..	..	..	..		..
				
Aug.									
5	..	..	..	..	..	..		..
12	..	..	..	..	..	..		..
19	..	..	..	..	..	..		..
26	..	..	..	..	..	..		..
				

BEANS—continued.

Date.	Quantity offered for Sale.	Quantity Sold.	Highest Price.	Lowest Price.	Average Price.	Table of Bushel- weights for	
						Highest Price.	Lowest Price.
1903							
Sept.	Imp. qr.	Imp. qr.	s. d.	s. d.	s. d.	lb. lb.	lb. lb.
2	80	80	33 0	32 6	32 8	63	63
9	50	5	36 0	..	36 0	64	..
16	50	..	..	..	..	..	..
23	80	..	..	..	..	..	..
30	80	..	..	..	..	..	..
	240	85	33 7	32 6	32 10		
Oct.							
7	30	..	..	..	..	..	..
14	..	..	..	..	..	..	..
21	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..
		
Nov.							
4	..	..	..	..	..	..	..
11	30	..	..	..	..	..	..
18	..	..	..	..	..	..	..
25	..	..	..	..	..	..	..
		
Dec.							
2	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..
16	..	..	..	..	..	..	..
23	..	..	..	..	..	..	..
30	47	17	31 0	30 6	30 8	63	63
	47	17	31 0	30 6	30 8		
Result for year	1,532	498	32 10	31 5	31 10		

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	28 0	to 30 0	not quoted.		8 0	to 10 0
1819	25 0	" 27 0	15 0	to 17 0	10 6	" 12 0
1820	20 0	" 25 0	16 0	" 17 0	10 0	" 11 0
1821	19 0	" 20 0	14 0	" 16 0	7 6	" 8 0
1822	12 6	" 13 0	8 0	" 8 6	4 6	" 0 0
1823	13 6	" 18 0	7 0	" 10 6	5 6	" 6 0
1824	14 0	" 19 0	7 0	" 9 0	4 6	" 6 0
1825	20 0	" 32 0	15 0	" 10 0	9 0	" 10 6
1826	17 6	" 21 6	13 0	" 15 0	7 0	" 7 6
1827	15 0	" 24 0	not quoted.		7 0	" 8 0
1828	18 0	" 27 6	12 0	to 15 0	7 0	" 8 3
1829	18 0	" 24 0	12 6	" 14 0	7 0	" 8 6
1830	15 0	" 21 0	8 0	" 11 0	6 0	" 6 9
1831	18 0	" 25 0	0 0	" 13 0	7 0	" 8 0
1832	10 0	" 24 0	11 0	" 16 0	7 0	" 9 0
1833	22 0	" 31 0	13 6	" 20 0	8 0	" 11 3
1834	22 0	" 31 0	13 6	" 21 0	9 0	" 11 6
1835	22 0	" 27 6	18 0	" 20 6	8 0	" 11 0
1836	24 0	" 31 6	16 0	" 19 0	10 0	" 14 0
1837	19 0	" 28 0	14 0	" 19 0	10 0	" 13 0
1838	23 0	" 30 6	17 0	" 22 0	12 0	" 14 0
1839	23 0	" 31 0	14 0	" 19 0	0 0	" 18 0
1840	21 0	" 33 0	15 0	" 23 0	7 0	" 11 6
1841	28 0	" 30 0	14 0	" 22 0	8 0	" 12 0
1842	22 6	" 28 0	13 0	" 17 0	7 6	" 10 0
1843	19 0	" 25 0	8 0	" 12 0	5 0	" 8 0
1844	21 0	" 20 0	10 0	" 16 0	8 0	" 10 6
1845	23 0	" 33 0	13 0	" 20 0	8 0	" 13 0
1846	24 0	" 33 6	14 6	" 21 6	10 0	" 14 6
1847	24 0	" 35 0	13 0	" 24 0	11 6	" 15 0
1848	23 0	" 34 6	13 0	" 28 0	11 6	" 15 0
1849	21 0	" 30 2	12 0	" 31 0	0 0	" 14 0
1850	20 6	" 20 6	12 0	" 20 0	8 0	" 13 0
1851	21 6	" 31 0	13 0	" 21 0	8 9	" 14 0
1852	21 0	" 32 0	15 0	" 23 0	8 0	" 14 0
1853	26 6	" 38 0	17 0	" 28 6	9 0	" 17 0
1854	25 0	" 36 0	17 0	" 26 0	9 0	" 16 6
1855	28 6	" 36 0	16 0	" 25 0	10 0	" 17 0
1856	22 0	" 35 6	15 6	" 24 0	10 0	" 15 0
1857	24 0	" 36 0	14 6	" 26 0	10 6	" 14 6
1858	24 0	" 34 6	14 0	" 24 6	10 0	" 14 0
1859	25 0	" 34 6	16 0	" 25 0	10 3	" 14 9
1860	26 0	" 38 0	17 6	" 27 6	12 6	" 17 6
1861	26 0	" 38 6	16 0	" 28 0	9 0	" 16 0
1862	27 0	" 37 6	17 6	" 28 0	10 0	" 16 0
1863	25 0	" 38 6	19 0	" 28 6	10 0	" 10 0
1864	31 0	" 41 0	21 0	" 31 6	14 0	" 18 0
1865	32 6	" 44 0	22 6	" 33 6	14 6	" 20 0
1866	37 0	" 50 0	29 0	" 42 6	15 0	" 20 0
1867	26 0	" 58 0	18 0	" 25 6	12 0	" 16 0
1868	30 0	" 32 0	15 6	" 21 0	7 6	" 13 0
1869	28 0	" 38 0	15 0	" 22 6	7 6	" 14 0
1870	35 6	" 43 0	18 0	" 28 0	10 0	" 17 0
1871	36 6	" 40 0	22 0	" 33 6	14 0	" 20 0
1872	45 0	" 56 0	32 0	" 42 0	16 0	" 22 0
1873	42 0	" 51 0	25 0	" 42 0	15 6	" 22 0
1874	33 6	" 44 6	21 0	" 36 0	12 0	" 17 0
1875	33 0	" 48 6	21 0	" 34 0	13 6	" 23 6
1876	40 0	" 52 6	23 0	" 30 0	13 6	" 25 0
1877	41 0	" 51 0	25 0	" 37 0	15 0	" 24 0
1878	35 6	" 48 0	23 6	" 35 0	14 0	" 22 0
1879	34 0	" 44 0	21 0	" 34 0	14 0	" 20 0
1880	30 0	" 43 6	20 0	" 30 0	12 6	" 20 0
1881	32 0	" 45 6	29 0	" 34 0	14 0	" 20 0
1882	40 0	" 51 0	30 0	" 40 0	14 0	" 20 6
1883	44 0	" 55 6	34 0	" 46 6	15 6	" 23 0
1884	36 0	" 47 6	29 6	" 41 6	12 6	" 20 0
1885	30 0	" 38 0	24 0	" 31 0	12 0	" 18 0

TABLE No 1.—CHEVIOT SHEEP—*Continued*.

Year	Wethers				Ewes				Lunbs			
	s	d	to	s d	s	d	to	s d	s	d	to	s d
1886	32	0	to	40 0	21	0	to	29 0	12	6	to	19 0
1887	29	0	"	36 0	18	0	"	26 0	11	0	"	16 6
1888	30	0	"	38 0	19	0	"	27 0	13	0	"	17 6
1889	36	0	"	44 0	24	0	"	32 0	14	0	"	22 0
1890	31	0	"	40 0	22	0	"	30 0	12	6	"	20 0
1891	27	0	"	38 0	16	0	"	25 0	9	0	"	16 0
1892	22	0	"	30 6	13	0	"	22 0	5	0	"	11 0
1893	26	0	"	35 6	18	0	"	28 6	8	6	"	15 0
1894	26	0	"	37 0	20	0	"	31 0	10	6	"	18 6
1895	23	0	"	39 0	22	0	"	4 0	11	6	"	19 6
1896	24	6	"	34 0	19	0	"	0 6	9	0	"	16 6
1897	27	0	"	36 0	21	0	"	1 6	11	0	"	17 6
1898	27	0	"	37 0	22	0	"	2 6	12	0	"	18 6
1899	34	0	"	3 0	20	0	"	30 6	10	6	"	16 0
1900	26	0	"	36 0	22	0	"	32 6	12	0	"	17 0
1901	25	0	"	33 6	20	0	"	29 6	11	0	"	16 0
1902	24	0	"	31 6	19	0	"	27 0	9	6	"	14 6
1903	21	0	"	34 0	21	0	"	21 0	11	4	"	18 0

TABLE No. 2—BLACKFACED SHEEP.

Year	Wethers				Ewes				Lunbs			
	s	d	to	s d	s	d	to	s d	s	d	to	s d
1819	22	0	to	24 0	12	0	to	15 0	8	0	to	9 0
1820	20	0	"	23 3	15	6	"	17 0	7	0	"	8 6
1821	18	0	"	20 0	13	0	"	13 0	6	0	"	7 0
1822	11	6	"	13 6	5	6	"	6 0	4	6	"	0 0
1823	13	0	"	16 0	5	0	"	6 6	4	0	"	5 3
1824	9	6	"	13 6	6	0	"	7 0	4	0	"	5 0
1825	23	0	"	26 0	11	0	"	13 6	6	0	"	9 0
1826	15	0	"	17 0	6	0	"	9 0	4	6	"	6 0
1827	14	0	"	18 6	7	0	"	10 0	6	0	"	7 6
1828	15	0	"	20 0	8	0	"	11 0	6	0	"	7 6
1829	14	0	"	18 0	9	0	"	10 0	6	0	"	7 0
1830	9	6	"	13 0	4	0	"	6 0	4	0	"	6 0
1831	13	0	"	17 0	5	0	"	7 6	4	0	"	6 6
1832	14	0	"	18 0	7	0	"	11 6	4	0	"	7 8
1833	16	0	"	24 0	7	6	"	12 0	4	0	"	7 0
1834	16	0	"	22 0	10	0	"	12 0	4	0	"	8 0
1835	15	0	"	18 6	10	0	"	12 0	7	0	"	8 0
1836	15	0	"	21 0	9	0	"	12 0	5	6	"	11 0
1837	13	0	"	16 0	9	0	"	12 0	5	0	"	9 6
1838	15	0	"	20 6	10	0	"	13 0	not quoted			
1839	15	0	"	22 0	10	0	"	13 0	7	0	to	8 3
1840	15	0	"	22 6	11	0	"	13 0	7	0	"	9 3
1841	16	0	"	20 0	9	0	"	11 0	6	0	"	8 0
1842	14	0	"	19 0	7	6	"	8 0	5	6	"	7 0
1843	not quoted				4	6	"	6 6	not quoted			
1844	15	0	to	21 0	6	6	"	10 0	5	0	to	5 0
1845	14	0	"	23 0	8	0	"	12 0	4	0	"	5 0
1846	13	0	"	24 0	10	0	"	13 0	5	0	"	9 0
1847	20	6	"	25 0	10	0	"	14 0	5	6	"	10 6
1848	20	0	"	24 0	11	3	"	12 0	5	6	"	10 0
1849	not quoted				not quoted				7	0	"	7 6
1850									7	0	"	0 0
1851	17	6	to	28 0	9	0	to	12 0	6	6	"	8 0
1852	18	6	"	22 0	9	6	"	12 0	4	6	"	7 9
1853	23	0	"	27 0	14	6	"	16 6	8	0	"	11 6
1854	20	0	"	26 0	11	0	"	16 6	8	0	"	10 6
1855	23	6	"	26 6	14	0	"	16 0	10	0	"	11 0
1856	17	0	"	24 0	10	0	"	20 0	7	6	"	10 0
1857	20	0	"	29 0	10	6	"	15 0	9	3	"	11 0
1858	20	0	"	27 6	9	9	"	18 9	8	3	"	10 6
1859	20	0	"	25 0	10	0	"	14 0	8	9	"	11 0
1860	21	0	"	27 3	11	0	"	16 0	10	0	"	13 6
1861	21	0	"	29 0	12	0	"	22 0	6	3	"	14 0

TABLE NO. 2.—BLACKFACED SHEEP—*Continued.*

Year.	Wethers.				Ewes.				Lambs.			
	s.	d.	to	s. d.	s.	d.	to	s. d.	s.	d.	to	s. d.
1802	16	9	to	27 0	12	0	to	18 5	6	0	to	12 0
1803	20	0	"	30 6	13	0	"	18 0	8	0	"	11 6
1804	25	0	"	30 0	15	0	"	19 0	10	0	"	13 6
1805	15	6	"	32 6	15	0	"	25 0	10	0	"	17 0
1806	31	6	"	40 0	20	0	"	30 0	13	6	"	22 6
1807	20	0	"	30 6	14	0	"	22 0	7	6	"	13 6
1808	20	0	"	26 0	10	6	"	13 6	7	0	"	13 0
1809	22	0	"	26 0	11	0	"	14 0	6	9	"	9 0
1870	27	0	"	32 6	13	0	"	22 0	8	0	"	14 6
1871	23	0	"	37 0	13	0	"	23 0	11	0	"	16 3
1872	31	6	"	45 0	18	0	"	32 0	12	6	"	18 0
1873	28	0	"	39 0	16	6	"	27 0	7	0	"	16 0
1874	25	0	"	35 0	13	0	"	20 0	7	0	"	14 0
1875	26	6	"	37 6	15	0	"	21 3	9	6	"	17 6
1876	30	0	"	40 0	19	0	"	24 0	13	0	"	20 6
1877	35	0	"	35 9	18	0	"	25 0	13	6	"	23 0
1878	30	0	"	36 0	17	0	"	23 0	12	0	"	22 0
1879	25	0	"	35 9	16	0	"	21 0	10	6	"	20 0
1880	25	0	"	38 0	10	6	"	22 6	10	0	"	17 0
1881	30	0	"	39 0	15	0	"	23 0	10	0	"	15 0
1882	33	0	"	46 0	20	0	"	28 0	12	6	"	18 6
1883	36	0	"	50 6	24	6	"	33 0	14	0	"	21 6
1884	29	0	"	43 6	10	6	"	28 0	12	0	"	19 6
1885	24	0	"	31 0	13	0	"	22 6	10	0	"	15 0
1886	25	0	"	34 0	12	0	"	22 0	10	6	"	16 0
1887	22	0	"	30 0	11	0	"	19 0	8	0	"	13 0
1888	22	0	"	32 0	13	0	"	21 0	10	0	"	15 0
1889	26	0	"	40 0	18	0	"	29 0	13	0	"	22 0
1890	24	0	"	37 0	14	0	"	27 0	10	6	"	19 0
1891	21	0	"	37 0	10	0	"	24 0	7	6	"	15 0
1892	16	0	"	25 6	6	0	"	17 0	3	0	"	10 0
1893	21	0	"	37 0	12	0	"	24 0	7	0	"	14 6
1894	20	0	"	37 6	14	6	"	26 6	8	6	"	16 0
1895	23	0	"	41 0	16	0	"	28 6	9	0	"	17 0
1896	19	0	"	35 4	13	0	"	24 0	6	0	"	13 6
1897	21	0	"	36 6	15	0	"	25 6	7	0	"	14 6
1898	22	0	"	37 0	16	0	"	26 6	8	0	"	15 0
1899	20	0	"	33 6	13	0	"	24 0	5	6	"	12 0
1900	23	0	"	36 0	16	0	"	26 6	8	0	"	15 6
1901	20	0	"	35 0	14	0	"	25 6	6	6	"	14 6
1902	18	6	"	31 0	12	0	"	24 0	6	0	"	14 0
1903	21	0	"	36 0	15	0	"	28 0	7	0	"	16 6

TABLE NO. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland		White Highland.	
	s.	d.	s.	d.	s.	d.	s.	d.
1818	40	0	to	42 2	20	0	to	22 6
1819	31	0	"	22 0	10	0	"	10 3
1820	20	0	"	22 0	9	0	"	10 0
1821	18	0	"	20 0	9	0	"	10 0
1822	12	6	"	11 6	5	0	"	6 6
1823	9	0	"	10 6	5	0	"	5 9
1824	13	6	"	15 0	6	0	"	6 3
1825	10	6	"	22 0	10	0	"	10 6
1826	11	0	"	14 0	5	0	"	5 6
1827	11	0	"	14 0	5	6	"	6 9
1828	8	0	"	11 0	5	6	"	6 0
1829	8	6	"	11 0	4	3	"	0 0
1830	9	6	"	11 0	4	6	"	5 0
1831	17	0	"	20 0	7	6	"	8 6
1832	14	0	"	16 0	7	0	"	7 6
1833	18	0	"	20 7	10	0	"	11 0
1834	21	0	"	24 6	5	6	"	7 0
1835	19	0	"	20 6	9	6	"	10 8

TABLE NO. 3.—PRICE OF WOOL—Continued.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1836	21 0	to 25 0			10 0	to 14 0		
1837	12 0	" 14 0			7 0	" 7 8		
1838	19 0	" 22 6			6 0	" 10 0		
1839	18 0	" 20 0			8 0	" 12 0		
1840	15 0	" 0 0			7 0	" 0 0		
1841	15 0	" 16 9			6 0	" 7 5		
1842	12 6	" 14 0			not quoted.			
1843	9 0	" 11 6			5 0	to 6 0		
1844	15 0	" 18 0			not quoted.			
1845	14 6	" 17 6			7 6	to 8 6		
1846	12 0	" 14 6			8 0	" 8 6		
1847	12 6	" 14 0			not quoted.			
1848	9 6	" 11 0			4 9	to 0 0		
1849	12 0	" 16 6			6 0	" 6 3		
1850	15 0	" 17 6			8 0	" 8 6		
1851	12 0	" 16 0			8 0	" 9 5		
1852	13 0	" 15 0			8 0	" 9 0		
1853	19 0	" 22 0			11 0	" 12 6		
1854	12 0	" 15 0			7 6	" 8 6		
1855	14 6	" 19 0			8 6	" 9 0		
1856	19 0	" 21 6			11 0	" 0 0		
1857	19 0	" 24 0			13 0	" 11 3		
1858	15 0	" 17 0			5 9	" 10 0		
1859	18 6	" 24 0			10 9	" 11 6		
1860	22 0	" 32 0			10 0	" 11 3		
1861	19 6	" 27 0	37 0 to 38 0		not quoted.			
1862	18 6	" 26 0	from 30s. upwards.		11 6	to 16 0		
1863	25 6	" 31 0	30 0 to 37 0		15 3	" 17 6		
1864	31 0	" 39 0	38 0 " 42 0		17 6	" 20 0		
1865	28 0	" 30 0	47 0 " 54 0		15 0	" 17 0		
1866	24 0	" 30 0	44 0 " 45 0		14 0	" 16 0		
1867	16 0	" 21 6	30 0 " 33 0		not quoted.			
1868	19 0	" 26 0	not quoted.		8 8	to 9 0		
1869	18 0	" 26 6	28 0 to 32 0		8 6	" 10 0		
1870	15 0	" 23 6	not quoted.		9 6	" 0 0		
1871	20 0	" 26 6	25 0 to 26 0		12 0	" 15 0		
1872	26 0	" 37 6	30 0 " 34 6		18 0	" 21 0		
1873	17 0	" 18 0	40 0 " 48 0		0 0	" 12 0		
1874	18 0	" 26 6	34 0 " 40 0		9 6	" 13 0		
1875	25 0	" 32 0	30 0 " 31 0		12 6	" 16 0		
1876	20 0	" 24 0	34 6 " 36 0		9 6	" 12 0		
1877	20 0	" 26 0	30 0 " 34 6		10 0	" 12 0		
1878	18 0	" 25 0	28 0 " 30 0		8 6	" 11 6		
1879	15 0	" 17 0	27 0 " 32 0		7 0	" 0 0		
1880	20 0	" 24 0	prices very low.		10 6	" 11 6	14 0	to 15 0
1881	17 0	" 21 0	30 0 to 32 0		5 0	" 9 6	12 0	" 13 0
1882	14 0	" 18 0	27 0 " 30 0		7 6	" 9 0	13 0	" 14 0
1883	13 0	" 18 0	26 0 " 28 0		6 6	" 8 6	11 6	" 12 6
1884	13 0	" 18 0	26 0 " 26 0		6 6	" 8 6	11 6	" 12 6
1885	12 0	" 17 0	22 6 " 26 0		6 0	" 8 0	11 6	" 12 0
1886	13 0	" 18 0	23 0 " 27 6		6 6	" 6 6	11 6	" 12 0
1887	14 0	" 22 0	23 0 " 28 0		7 0	" 9 0	11 6	" 13 0
1888	13 0	" 20 0	23 0 " 28 0		7 0	" 9 0	11 0	" 12 6
1889	13 0	" 18 0	24 0 " 28 0		7 0	" 9 0	11 0	" 12 6
1890	13 0	" 18 0	24 0 " 28 0		7 0	" 9 0	11 0	" 12 6
1891	12 6	" 18 0	22 0 " 28 0		7 0	" 9 0	11 0	" 12 6
1892	12 0	" 18 0	20 0 " 28 0		7 0	" 8 6	10 6	" 12 0
1893	12 0	" 17 0	20 0 " 27 0		7 0	" 8 0	10 0	" 12 0
1894	12 0	" 16 0	20 0 " 26 0		7 0	" 8 0	10 0	" 12 0
1895	12 0	" 16 0	20 0 " 25 0		7 0	" 8 0	10 0	" 11 6
1896	11 0	" 15 0	19 0 " 24 0		7 0	" 8 0	10 0	" 11 6
1897	11 0	" 14 0	18 0 " 23 0		7 0	" 8 0	10 6	" 12 0
1898	10 0	" 13 0	16 0 " 20 0		7 0	" 8 0	10 0	" 11 6
1899	10 0	" 13 0	18 0 " 18 6		7 0	" 8 0	8 6	" 9 6
1900	9 9	" 12 0	13 0 " 18 6		6 9	" 7 9	8 0	" 9 6
1901	9 0	" 10 0	11 0 " 16 6		5 9	" 6 6	8 0	" 9 0
1902	9 0	" 10 0	11 6 " 17 0		6 0	" 6 6	8 6	" 9 6
1903	10 0	" 12 0	15 0 " 18 0		7 0	" 8 0	11 6	" 12 6

GENERAL SHOW AT DUMFRIES, 1903.

THE Show of the Society for 1903 took place at Dumfries on Tuesday 21st July and three following days. A site was obtained on the farm of Tinwald Downs, Locharbriggs. The ground was suitable, but the distance from the town of Dumfries was so great as to militate against the success of the Show. The supply of water, led into the showyard at considerable expense, unfortunately proved inadequate, and caused much inconvenience to exhibitors.

The weather was wet on the opening day, but was favourable on the other three days. On the first three days the attendance of the public was quite up to expectation, but on the closing day it was disappointing.

On the whole the drawings were fairly good, and a handsome local fund was provided (chiefly by voluntary assessment) by the landed proprietors of the counties of Dumfries, Kirkcudbright, and Wigtown, and by the town of Dumfries. The income exceeded the expenditure by about £10. This is all the more gratifying in view of the fact that the amount offered by the Society in premiums exceeded that for the Dumfries Show of 1895 by about £650. The local town and county authorities co-operated most cordially with the Society in promoting the success of the Show.

The display of live stock was large and of a very high character. An unusually fine collection of implements and machines filled the Implement Section of the yard.

Statistics.

The following tables give the number of entries in the various sections :—

1. CATTLE.

Class.	SHORTHORN.										No of Entries.
1. Aged bulls	8
2. Two-year-old bulls	4
3. One-year-old bulls	9
4. Cows of any age	7
5. Two-year-old heifers	8
6. One-year-old heifers	9
											— 45
	ABERDEEN-ANGUS.										
7. Aged bulls	10
8. Two-year-old bulls	6
9. One-year-old bulls	12
10. Cows of any age	12
11. Two-year-old heifers	10
12. One-year-old heifers	20
											— 70

GALLOWAY.

13. Aged bulls	9
Extra stock	1
14. Two-year-old bulls	6
15. One-year-old bulls	7
16. Cows of any age	17
17. Two-year-old heifers	16
18. One-year-old heifers	19
	— 75

HIGHLAND.

19. Aged bulls	2
20. Two-year-old bulls	5
21. One-year-old bulls	6
22. Cows of any age	8
23. Three-year-old heifers	5
24. Two-year-old heifers	10
	— 36

Ayrshire.

25. Aged bulls	3
Extra stock	1
26. Two-year-old bulls	4
27. One-year-old bulls	8
28. Cows in milk, calved before 1900	8
29. Cows in milk, calved after 1st January 1900	8
30. Cows of any age, in calf, or heifers in calf, calved in 1900	8
31. Two-year-old heifers	6
32. One-year-old heifers	7
	— 53
	279

2. HORSES.

DRAUGHT STALLIONS.

33. Aged stallions	11
34. Three-year-old entire colts	9
35. Two-year-old entire colts	22
36. One-year-old entire colts	13
	— 55

DRAUGHT GELDINGS.

37. Aged geldings	4
38. Three-year-old geldings	6
39. Two-year-old geldings	6
	— 16

DRAUGHT MARES AND FILLIES.

40. Mares with foal at foot	8
41. Yeld mares, foaled before 1900	6
42. Three-year-old yeld mares, or fillies	7
43. Two-year-old fillies	16
44. One-year-old fillies	12
	— 49

HUNTERS.

45. Colt, gelding, or filly, foaled in 1902, the produce of thoroughbred stallions	16
46. Filly, mare, or gelding, for field, foaled in 1901—in hand	13
47. Yeld mare, filly, or gelding, for field, foaled in 1900—in hand	12
48. Mare or gelding, foaled in 1899, able to carry over 13 st 7 lb.	5
49. Mare or gelding, foaled in 1899, able to carry from 12 st. to 13 st 7 lb	2
50. Mare or gelding, foaled before 1899, able to carry over 15 st.	12
51. Mare or gelding, foaled before 1899, able to carry 13 st 7 lb. to 15 st	8
52. Mare or gelding, foaled before 1899, able to carry 12 st to 13 st. 7 lb.	9
53. Hunter, brood mare, with foal at foot, or to foal this season	8
	— 85

HACKNEYS.

54. Brood mares, 15 hands and upwards, with foal at foot, or to foal this season to a registered sire	2
55. Brood mares, under 15 hands, with foal at foot, or to foal this season to a registered sire	2
56. Yeld mares or fillies, three years old	3
57. Filly, two years old	1
58. Fillies, one year old	4
59. Stallions, foaled in or before 1900, over 15 hands	3
60. Stallion, foaled in or before 1900, over 14 and not over 15 hands	1
61. Entire colts, two years old	2
62. Entire colts, one year old	3
	— 21

PONIES.

63. Stallions, 3 years old and upwards, over 12 and not exceeding 14 hands	6
64. Yeld mares, fillies, or geldings, 3 years old and upwards, over 13 and not over 14½ hands	3
65. Yeld mares, fillies, or geldings, 3 years old and upwards, over 12 and not over 13 hands	4
66. Stallion, 3 years old and upwards, 12 hands and under. (<i>No Entry.</i>)	
67. Yeld mares, fillies, or geldings, 3 years old and upwards, 12 hands and under	3
68. Highland pony stallion, 3 years old or upwards, not exceeding 14½ hands, entered or accepted for entry in the Highland section of the Polo Pony Stud-Book	1
Extra stock	1
69. Highland pony mares, 3 years old or upwards, not exceeding 14½ hands, yeld or with foal at foot, entered or accepted for entry in the Highland section of the Polo Pony Stud-Book	2
70. Shetland stallions, not exceeding 10½ hands, foaled before 1900	5
71. Shetland entire colts, not exceeding 10½ hands, foaled in 1900 or 1901	1
72. Shetland mares, not exceeding 10½ hands, with foal at foot	5
73. Shetland yeld mares, not exceeding 10½ hands	7
74. Shetland fillies, not exceeding 10½ hands, foaled in 1900 or 1901	4
	— 45

DRIVING COMPETITIONS.

75. Yeld mares, fillies, or geldings, in harness, 15 hands and upwards	5
76. Yeld mares, fillies, or geldings, in harness, under 15 hands (5)	3
	— 8

JUMPING.

1. Horses or ponies, any height	17
2. Horses or ponies, any height—handicap	15
3. Horses or ponies, any height—handicap	17
	— 49

3. SHEEP.

BLACKFACED.

77. Tups above one shear	16
78. Shearling tups	26
79. Ewes above one shear, with lambs	10
80. Shearling ewes or gimmers	14
	— 66

CHEVIOT.

81. Tups above one shear	20
82. Shearling tups	19
83. Ewes above one shear, with lambs	17
84. Shearling ewes or gimmers	17
	— 73

BORDER LEICESTER.

85. Tups above one shear	9
86. Shearling tups	32
87. Ewes above one shear	6
88. Shearling ewes or gimmers	20
	— 67

HALF-BRED.		
89. Tups above one shear	8	
90. Shearling tups	8	
91. Ewes above one shear	2	
92. Shearling ewes or gimmers	5	18
SHROPSHIRE.		
93. Tup above one shear	4	
94. Shearling tups	7	
95. Ewes above one shear	3	
96. Shearling ewes or gimmers	4	18
OXFORD DOWNS.		
97. Shearling tups	8	
98. Shearling ewes or gimmers	9	17
SUFFOLK.		
99. Shearling tups	2	
100. Shearling ewes or gimmers	3	
101. Three ewe lambs	2	7
EXTRA SECTIONS.		
102. Fat lambs, any breed or cross	7	7
		<u>278</u>

4. WOOL.

103. Blackface wether wool	3	
104. Blackface ewe wool	6	
105. Blackface ewe or wether hogg wool	6	
106. Blackface ewe wool, best adapted for rent-paying purposes, single fleece	9	
107. Blackface ewe hogg or wether hogg wool, best adapted for rent-paying purposes, single fleece	9	33

5. SWINE.

108. Boars, large white breed	5	
109. Sows, large white breed	6	
110. Pigs not above 8 months old, large white breed	7	
111. Boar, white breed other than large	2	
112. Sow, white breed other than large	2	
113. Pigs not above 8 months old, white breed other than large	3	
114. Boars, Berkshire breed	2	
115. Sows, Berkshire breed	2	
116. Pigs not above 8 months old, Berkshire breed	2	31

6. POULTRY.

1-82. Poultry	419
-------------------------	-----

7. DAIRY PRODUCE.

1. Cured butter, not less than 7 lb.	9	
2. Powdered butter, not less than 7 lb.	12	
3. Fresh butter, 3 1-lb. rolls	16	
4. Cheddar Cheese, 56 lb. and upwards	41	
5. Sweet-milk Cheese, flat shape, white in colour, made according to the Dunlop or other method	22	
6. Cheddar Cheese, 14 lb. and under	28	128

ABSTRACT.

								No. of Entries.
1. Cattle	.	.	.	.	.	.	.	279
2. Horses	.	.	.	.	.	.	.	282
3. Sheep	.	.	.	.	.	.	.	273
4. Wool	.	.	.	.	.	.	.	33
5. Swine	.	.	.	.	.	.	.	31
6. Poultry	.	.	.	.	.	.	.	419
7. Dairy produce	.	.	.	.	.	.	.	128

The following table gives a comparative view of the display of cattle, horses, sheep, swine, poultry, dairy produce, and implements, of the value of the premiums offered, and of the receipts at the entrance-gates, grand stands, and for catalogues at the Shows which have been held at Dumfries:—

Year.	Cattle.	Horses.	Sheep.	Wool.	Swine.	Poultry.	Dairy Produce.	Imple-ments.	Premi-ums.	Re-ceipts.
1830	180	62	57		19	...	..	18	£353	£163
1837	181	77	118	...	14	...	31	36	650	382
1845	297	75	126		36	48	88	143	900	440
1860	298	166	279		12	72	195	911	1500	1275
1870	374	171	322		39	134	180	1873	1600	1897
1878	357	323	308		27	227	235	2578	2763	3308
1886	287	312	292		22	144	146	1639	2583	2314
1895	269	333	226		..	245	114	2265	2456	2599
1903	279	282	273	33	31	419	128	1834	3073	2919

A Comparison.

The following figures, relating to some of the most successful Shows the Society has held, will be perused with interest:—

	Cattle.	Horse.	Sheep.	Swine.	Poultry.	Total Live Stock.	Imple-ments.	Premi-ums.	Drawing at Show.	Profit.
Edinburgh, 1869	310	212	340	22	239	1123	1900	£1600	£4,078	£2067
Glasgow, 1875	411	105	296	48	479	1639	2220	2665	6,231	3316
Edinburgh, 1877	339	342	305	30	234	1250	2292	2714	6,734	3710
Edinburgh, 1884	580	453	493	35	253	1814	2282	4343	6,548	1855
Edinburgh, 1893	330	349	294	31	360	1414	2268	2600	4,918	2323
Aberdeen, 1894	314	324	184	31	365	1221	2532	2440	5,121	1678
Perth, 1896	292	258	204	20	374	1148	1945	2205	4,788	2511
Glasgow, 1897	317	350	245	30	275	1217	2227	2897	4,392	2021
Edinburgh, 1899	386	518	477	46	551	1978	2535	3844	10,285	3911
Stirling, 1900	321	288	369	28	457	1463	2095	2915	4,305	1078
Inverness, 1901	360	257	204	22	499	1340	1460	2806	2,485	99
Aberdeen, 1902	330	253	243	12	475	1343	1983	2796	4,413	1604
Dumfries, 1903	279	282	273	31	419	1234	1834	3073	2,919	12

Cattle.

Shorthorn cattle made a disappointing appearance in regard to numbers, only 45 animals having been entered as against 104 at Aberdeen in 1902. This was, of course, mainly due to the considerable distance between the centre of the Show and the parts of the country in which shorthorns are most largely reared. With respect to merit the breed was well represented, the majority of the prizes being animals of a high character. In a strong class of aged bulls Sir John Gilmour came to the front with "Royal Archer," 82,127 (fig. 52), a big, handsome roan, well proportioned and heavily fleshed. He was bred by Sir John, and got by the famous Collynie sire "Brave Archer," 70,018. With general approval the champion prizes for shorthorns went to "Royal Archer." The younger shorthorn bulls were not numerous, but of creditable merit. The female classes of shorthorns were on the whole rather larger, and the average standard of merit was fairly satisfactory. Mr Harrison's well-known prize-winner "Flora 6th" was well enough entitled to the first prize amongst cows and the special prize for the best female shorthorn. The shorthorn heifers made a fairly good appearance.

In view of the long distance of the Show from the home of the breed, Aberdeen-Angus cattle made a strong display in regard to numbers. With the exception of that of two-year-old bulls the classes were all well filled, and all over a high standard of merit was reached. The President's Champion Medal for the best animal of the Aberdeen-Angus breed went to Mr T. H. Bainbridge for his valuable bull "Maramere," 18,160 (fig. 53). This handsome bull was very generally admired, yet many good judges would have given the premier position to Mr Sharp's third-prize bull "Just Rover of Morlich 2nd," 18,000. In a small class of two-year-old and a large class of yearling Aberdeen-Angus bulls animals of decidedly high merit were found for the leading honours. The cow class of this breed, with its dozen entries, made a very fine appearance in the judging ring. Mr Bainbridge's handsome first prize cow "Neat Nellie," 29,426, more than justifies the name by which she is known. There was an excellent display in the heifer classes.

In the heart of the historic home of the breed a fine display of Galloway cattle was looked for, and assuredly visitors were not disappointed. The breed made up the largest entry in the cattle department, and not for many a day has it given a better account of itself. It will suffice to say that in all the classes there were animals of the highest merit, handsomely shaped, and true to the best characteristics of the breed. The "blue ribbon" of the breed went to Mr John Cunningham, Tarbreoch,

for his finely-shaped cow "Lady Harden 2nd of Durhamhill," 14,354 (fig. 54).

Highland cattle were fairly numerous, and in respect of merit the breed was creditably represented. The President's Champion Medal for the best animal of the Highland breed went to the Earl of Southesk for his characteristic bull "King Alaric," 1712 (fig. 55).

A larger entry of Ayrshire cattle was looked for, yet on the whole the classes of the breed were only moderately well filled. There was no lack of merit, and in most cases the contests were keen. As usual the "blue ribbon" went to the cow classes, the President's Champion Medal having been won by Mr Alexander Cross of Knockdon for his handsomely formed cow "Blood 2nd," 12,797 (fig. 56). Mr James Howie's champion bull "Gentleman John of Hillhouse," 4934, is a stylish animal of exceptional merit.

Horses.

As in former years the strongest feature in this department was the turn out of Clydesdale horses. In the breeding classes there were in all 107 entries, and, with regard to merit, it was generally acknowledged that the breed has not often in recent years been better represented. The stallion classes made a grand appearance in the judging ring, while the two- and one-year-old colts also mustered creditably. The President's Champion Medal for the best Clydesdale stallion or colt was, for the third year in succession, awarded to Messrs A. & W. Montgomery for their particularly handsome three-year-old stallion "Everlasting," 11,331 (fig. 57). The record attained by this fine young horse is indeed a wonderful one.

The classes of draught geldings were fairly well filled. The President's Champion Medal was secured by Mr George Johnstone, jun., for "Conqueror" (fig. 58), a very good three-year-old of unknown breeding.

Clydesdale mares and fillies filled their classes well, and displayed a high standard of merit. Mr Thomas Smith secured the Cawdor Cup and President's Medal for the best Clydesdale female with his well-known five-year-old "Baron's Pride" mare "Cedric Princess" (fig. 59).

Hunting horses formed an interesting and important display, thanks in no small measure to the liberal support of members of the Dumfriesshire Hunt. The President's Medal for the best animal in the hunter classes was awarded to Mr Alexander Cross of Knockdon for his valuable aged bay mare "Blitz" (fig. 60).

The Hackney classes were not large, but they contained a

number of choice representatives of the breed. Here the President's Medal went to Messrs T. & R. Black for their stylish three-year-old chestnut stallion 8290 (fig. 61).

In a small but very good muster of Ponies Mr B. Prior won the President's Medal with his attractive five-year-old stallion "Tom Gordon" (fig. 62). Highland ponies were few in number, yet they excited a good deal of interest. The President's Medal for the best Highland pony was won by Mr D. Stewart for his excellent stallion "Moss Crop," 256 (fig. 63).

There were few entries in the driving classes, but some of the animals were of surpassing merit. Mr John Wother-
spoon won the President's Medal with his handsome five-year-old chestnut gelding "Patronus," 7215 (fig. 64). Shetland ponies as usual made up a capital display. Mr G. A. Miller won the President's Medal for the best Shetland pony with his beautiful seven-year-old mare "Beatrice," 1533 (fig. 65). Much interest was, as usual, taken in the jumping contests.

The show of sheep was of a high character all over. For the President's Medals thoroughly good representatives of all the breeds were found (figs. 66-72). There was an interesting collection of wool. Swine were above the average of recent years. Mr R. M. Knowles won the President's Champion Medal for pigs with his handsome Large White sow "Colston Lass," 11,216 (fig. 73). There was a large and excellent show of poultry.



Fig 52 —SHORTHORN BULL, "ROYAL ARCHER" 82,127

Winner of President's Medal for best Shorthorn Dumfries Show 1908 Bred by and the property of Sir John Gilmour Bart of Lanholm and Montrose Age three years and five months

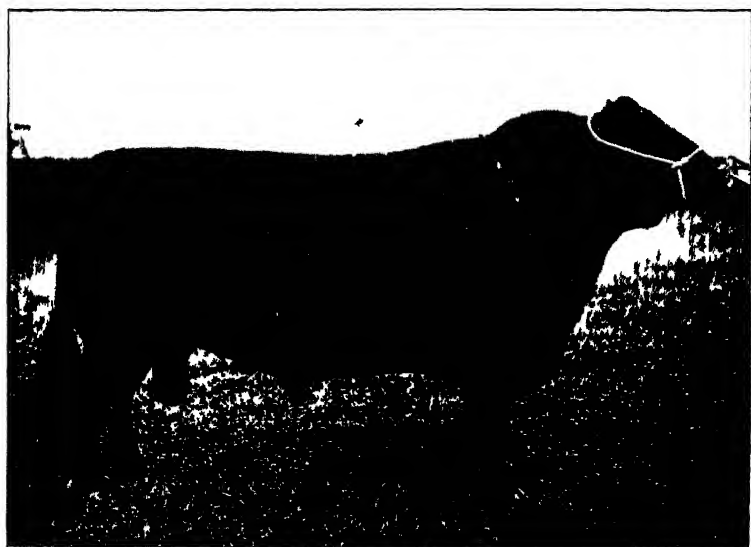


Fig 53 —ABERDEEN ANGUS BULL, "MARIMERE" 18,160

Winner of President's Medal for best Aberdeen Angus animal Dumfries Show 1908 The property of Mr T H Bainbridge Fiddlet Hall Felton Northumberland and bred by Mr A W Lown, Auchinloch Buthmal, Age three years and six months



Fig 34.—GALLOWAY COW, "LADY HARDEY 2ND OF DURHAMHILL" 14,354
Winner of President's Medal for best Galloway, Dumfries Show, 1903 Bred by and the property
of Mr John Cunningham, Tarbrooch, Dalbeattie Age eight years



Fig 35.—HIGHLAND BULL, "KING ATAIRN" 1712
Winner of President's Medal for best Highland animal, Dumfries Show 1903 Bred by and the
property of the Earl of Southesk, K.T., Kinnaird Castle Brechin Age two years and
five months.



Fig 56 — YORKSHIRE COW BLOOD 2ND 12797

Winner of President's Medal for best Yorkshire Dumfries Show 10 Bred by and the property of Mr Alex Cross of Knocklough May 1894 Age four years



Fig 57 — CLYDESDALE STALLION, "EVERLASTING" 11331

Winner of President's Medal for best Clydesdale Stallion or Colt Dumfries Show 1903 The property of Messrs A & W Maitland, Netherhill and Bauls, Kilmacduff Bred by Mr W M Wood, Furston Hall Pontefract Age three years and four months

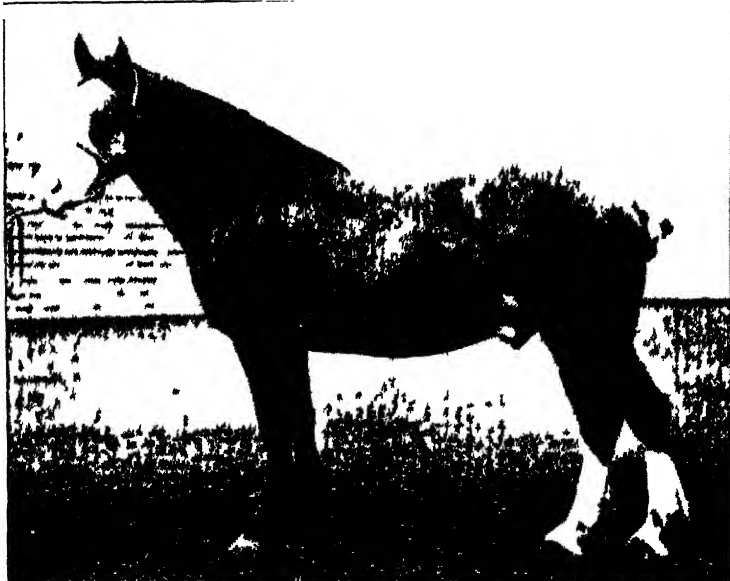


Fig 58 —DRAUGHT GELDING, 'CONQUEROR'

Winner of President's Medal for best Draught Gelding Dumfries Show 190 The property of
Mr George Johnstone jun Airlie Age three years



Fig 59 —CLYDESDALE MARE, 'CEDRIC PRINCESS'

Winner of President's Medal for best Clydesdale Mare & Filly Dumfries Show 1903 Belby
and the property of Mr T Smith Blon Point Chester Age five years

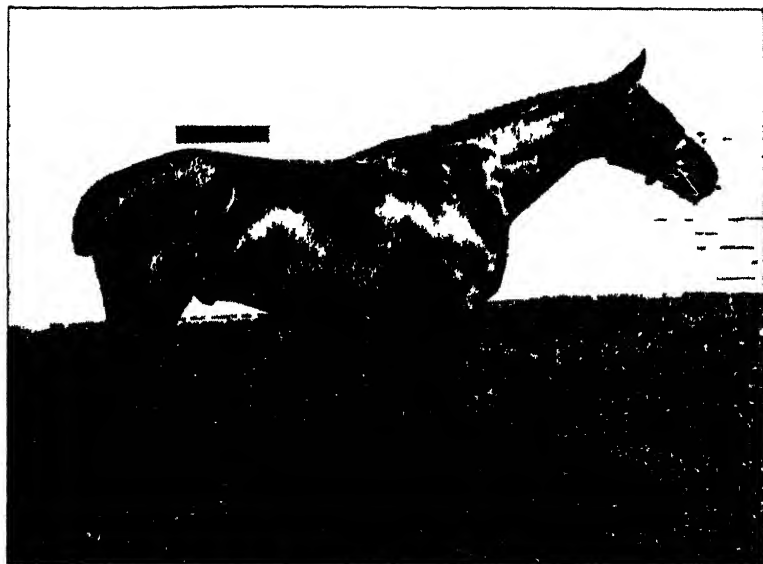


Fig 60 —HUNTER MARE, "BLITZ"

Winner of President's Medal for best Hunter, Dunfermline Show 1903 The property of Mr Alex Cross of Knockdun, N. Blythe Aged

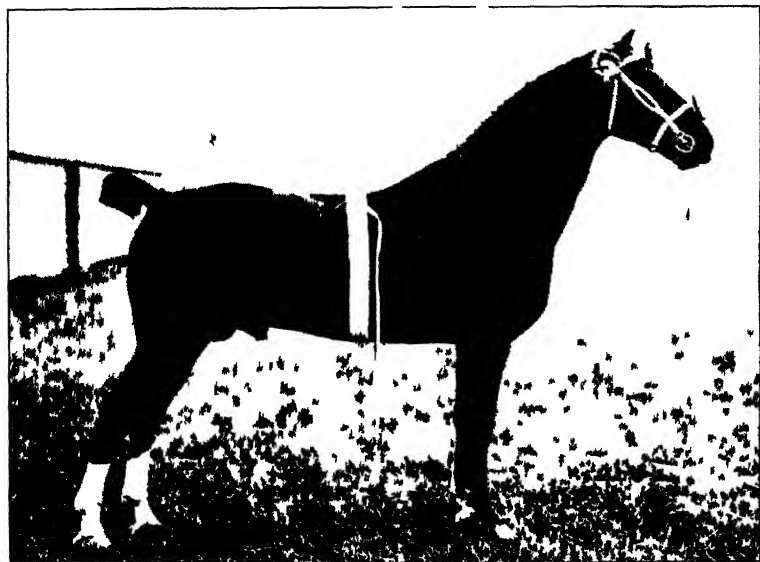


Fig 61 —HACKNEY STALLION, "ST JOHN" 8290

Winner of President's Medal for best Hackney, Dunfermline Show 1903 The property of Messrs T and R Black Whitewall Malton and bred by Mr R Bingham Millington & Co Aged three years

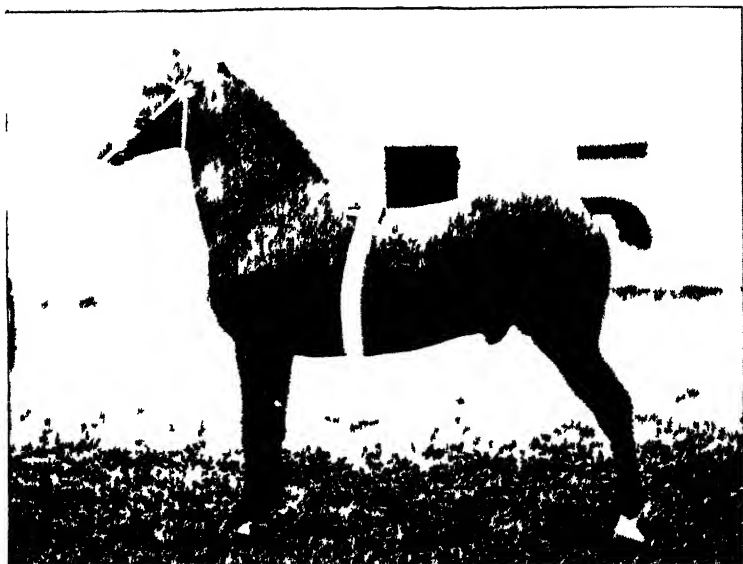


Fig 62 —PONY STALLION, 'TOM GORDON

Winner of President's Medal for best Pony, Dumfries Show 1908. The property of Mr B Prior, Britton House, Gosforth Park, Newcastle on Tyne. Bred by Mr E Smith, Benton House. Age five years.



Fig 63 —HIGHLAND PONY STALLION, "MOSS CREEK 256

Winner of President's Medal for best Highland Pony, Dumfries Show 1908. The property of Mr D Stewart, Drumchowie Pitlochry, and bred by the late Mr Alex Macdonald, Blairnald Loch, Idy. Age five years.



Fig 64 — GELDING PATRONS 721, IN HARNESS

Winner of Pic 111's Medal for best Animal in Harness, Dumfries Show 1908. The property of Mr John Wofth 151, on Munn's use. Motherwell and bred by the Horsh Stud Co. Cc 1890. Age five years.



Fig 65 —SHETLAND PONY MARE, 'BEATRICE' 1533

Winner of President's Medal for best Shetland Pony, Dumfries Show 1903. The property of Mr G A Miller, Lismuir Methven and bred by the Marquis of Londonderry. Age seven years



Fig 66 —BLACKFACED SHETLAND SHEPHERD

Winner of President's Medal for best Blackfaced Sheep, Dumfries Show 1903. Bred by and the property of Mr John Millar, Lumbhill, Strathaven



Fig 67 —CHEVIOT SHEARLING TUP

Winner of President's Medal for best Cheviot Dumfries Show 1901 Bred by and the property of Mr John Elliott Hillhouse Jellison

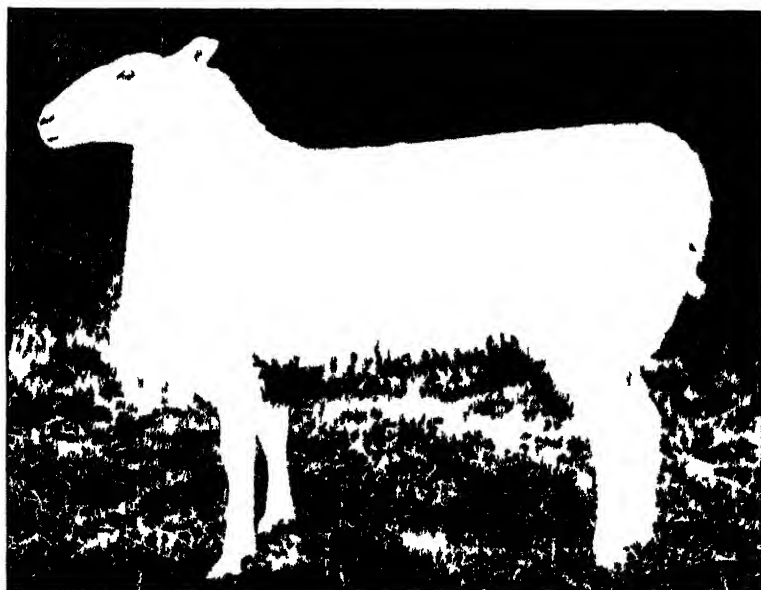


Fig 68 —BORDER LEICESTER SHEARLING TUP

Winner of President's Medal for best Border Leicester Dumfries Show 1901 Bred by and the property of Mr David Hunter Bailliewell Buchanan

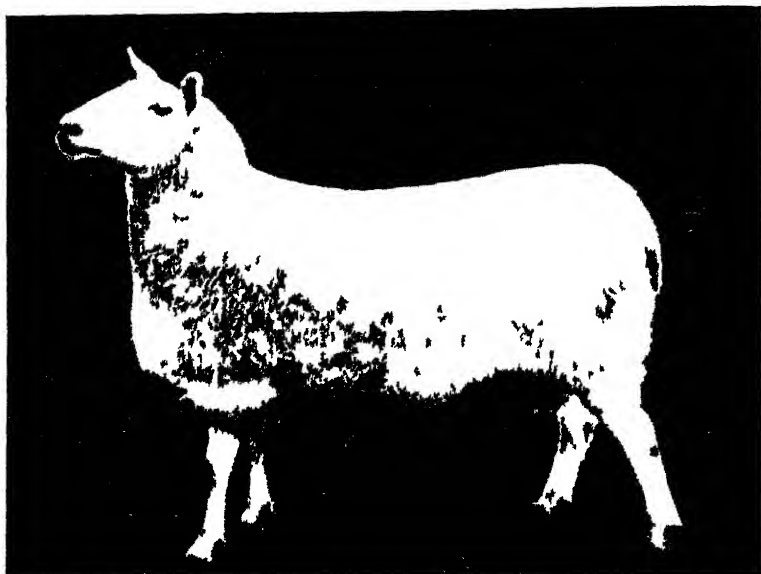


Fig 69 —HALF-BRED EWES

Winner of President's Medal for best Half-Bred Sheep, Dumfries Show, 1905. Bred by and the property of Mr J. A. W. McNeill, Huntly, Aberdeenshire. Age, three years.



Fig 70 —SHROPSHIRE TUP

Winner of President's Medal for best Shropshire, Dumfries Show, 1905. Bred by and the property of Mr Alfred Tanner, Shrewsbury, Shropshire. Age, two years.

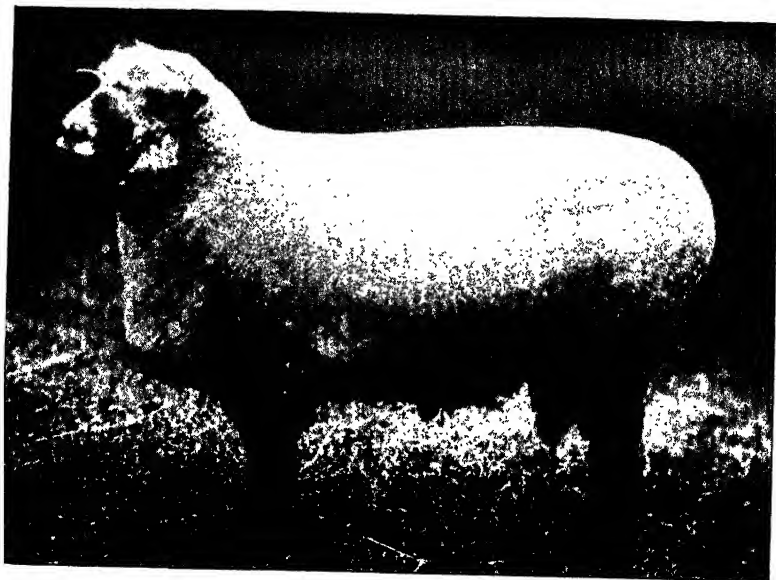


Fig. 71.—OXFORD DOWN SHEARLING TUP.

Winner of President's Medal for best Oxford Down, Dumfries Show, 1903. Bred by and the property of Mr James J. Hobbs, Maisey Hampton, Fairford, Gloucester.

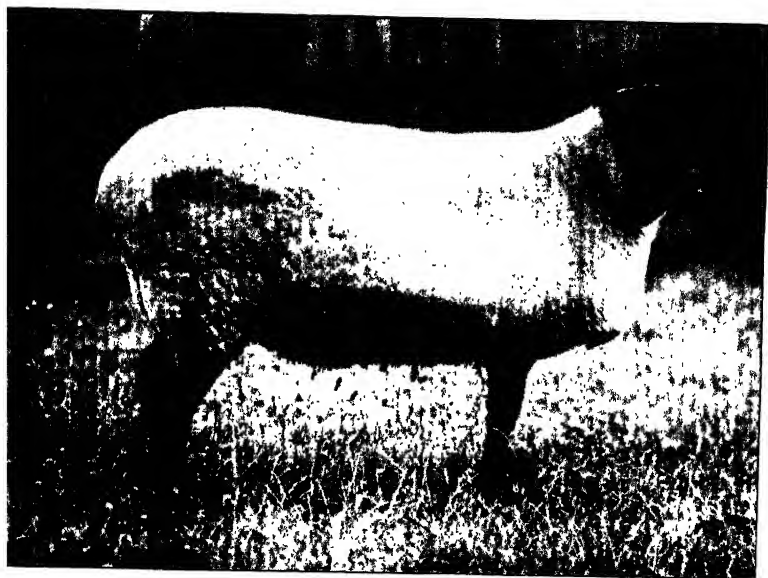


Fig. 72.—SUFFOLK EWE.

Winner of President's Medal for best Suffolk Sheep, Dumfries Show, 1903. Bred by and the property of Lieut.-Col. E. W. Baird, Exning House, Newmarket.

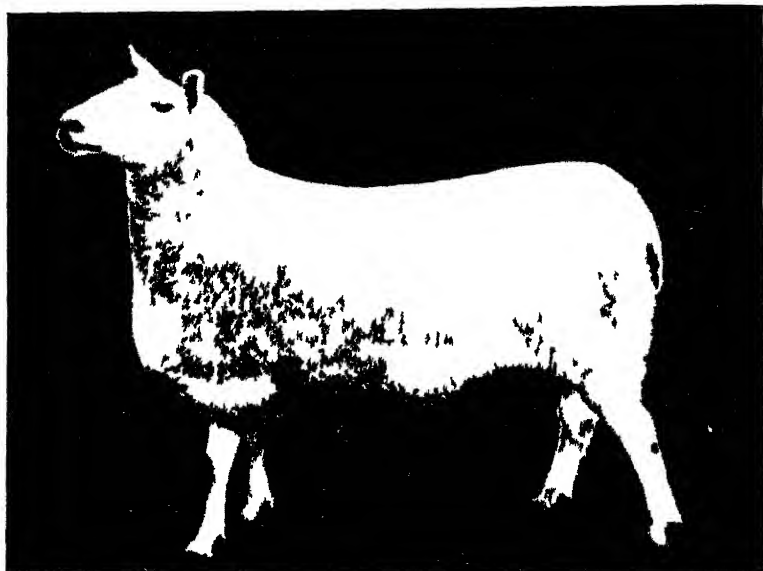


Fig 69 —HALF BRED EWES

Winner of President's Medal for best Half Bred Sheep Dumfries Show 1903 Bred by and the property of Mr J. A. W. McIn. Huntly Jellicoe, Ayrshire



Fig 70 —SHROPSHIRE TUP

Winner of President's Medal for best Shropshire Dumfries Show 1903 Bred by and the property of Mr Alfred Lunn, Shrewsbury Shropshire Age two years



Fig 71 — OXFORD DOWN SHEEP IN TUP

Willetts Medal for best Oxford Down of Show 1908 Bred by the
 property of Mr Jam J Hill, Warrington, Lancashire



Fig 72 — SUFFOLK EWE

Willetts Medal for best Suffolk Sheep, Dumfries Show 1908 Bred by the
 property of Lieut Col E W Baird, Exmouth House, Newmarket



Fig 73—LARGE WHITE SOW, CORSION LASS 11 216

Winn 1st President's Medal 1st best Pig Durham's Show 1905. The property of Mr R M Knjwles, Chestn Bisset Hill, Bingham Notts and bred by Mr A. A. Aitken, Cottingham Notts. Age three years and six months

PREMIUMS AWARDED BY THE SOCIETY IN 1903.

I.—R. SHIRRA GIBB, Doon, Lauder, for assisting in conducting
Agricultural Experiments—Gold Medal.

II.—DUMFRIES SHOW

21st, 22nd, 23rd, and 24th July 1903.

ABBREVIATIONS.—V., *Very Highly Commended*. H., *Highly Commended*.
C., *Commended*.

CATTLE

SHORTHORN.

PRESIDENT'S CHAMPION MEDAL for best Shorthorn.

Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Royal Archer" (82,127).

THE TWEEDDALE GOLD MEDAL, value £20, for best Shorthorn Bull.

Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Royal Archer" (82,127).

Breeder of best Bull of any age in Classes 1, 2, and 3—The Silver Medal.

Sir John Gilmour of Lundin and Montrave, Bart., Leven.

CLASS 1. BULL, calved before 1901.—Premiums, £15, £10, £5, and £3.

1. Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Royal Archer" (82,127).
2. J. Deane Willis, Bapton Manor, Codford, Wilts., "I.V." (50,707).
3. George Harrison, Gainford Hall, Darlington, "Silver Bell" (79,961).
4. J. Douglas Fletcher of Rosehaugh, Avoch, "Emperor's Heir" (78,815).
- V. Col. C. J. Johnston, Linkfield, Elgin, "Scottish Prince" (72,270).
- H. Lord Polwarth, Merton House, St Boswells, "Royal Cadogan" (77,710).
- C. John Grainger, Piteur, Coupar-Angus, "Count Nicholas" (76,435).

CLASS 2. BULL, calved in 1901.—Premiums, £15, £10, £5, and £3.

1. James A. Gordon, Arabella, Nigg Station, Ross-shire, "Prairie King" (81,878).
2. James Watt, Knowefield, Carlisle, "Merry Dandy" (81,693).

CLASS 3. BULL, calved in 1902.—Premiums, £12, £8, £4, and £2.

1. Duncan Stewart, Millhill, Crieff, "Proud Favourite."
2. James M'William, Stonytown, Keith, "Stoneytown Star."
3. George Harrison, Gainford Hall, Darlington, "Cumberland Pride."
4. John M'Ewen, Wester Cambushinnie, Braco, "North Star."

- V. A. G. Maxtone Graham, Battleby, Redgorton, Perth, "Knight of Strathern."
 H. Matthew Marshall, Bridgebank, Stranraer, "Roan Conqueror."
 C. Laurence Johnstone, Sands House, Kincardine-on-Forth, "Meridian."

Best Female in Classes 4, 5, and 6—£20, given by the Shorthorn Society.

George Harrison, Gainford Hall, Darlington, "Flora VI."

CLASS 4. COW, of any age.—Premiums, £12, £8, £4, and £2.

1. George Harrison, Gainford Hall, Darlington, "Flora VI"
2. J. Deane Willis, Bapton Manor, Codford, Wilts, "White Heather."
3. Charles Walford Kellock, Highfields, Audlem, Cheshire, "Sarah."
4. Colonel Munro, Mains of Murthly, Aberfeldy, "Lattice Leaf."
- V. Duncan Stewart, Millhills, Crief, "Lady 22nd."
- H. Lord Polwarth, Mertoun House, St Boswells, "Delilah Belle."
- C. J. Douglas Fletcher of Rosehaugh, Avoch, "Coral Fairr."

CLASS 5. HEIFER, calved in 1901.—Premiums, £10, £5, £3, and £2.

1. Robert Taylor, Pitliviie Farm, Carnoustie, "Pitliviie Undine."
2. J. Deane Willis, Bapton Manor, Codford, Wilts, "Malmesdon."
3. A. G. Maxtone Graham, Battleby, Redgorton, Perth, "Bride of Lincoln."
4. George Harrison, Gainford Hall, Darlington, "Faithful Alice VI."
- V. J. Douglas Fletcher of Rosehaugh, Avoch, "Miss Alice."
- H. Robert Taylor, Pitliviie Farm, Carnoustie, "Lovely Countess."
- C. George Harrison, Gainford Hall, Darlington, "Gainford Beauty."

CLASS 6. HEIFER, calved in 1902.—Premiums, £10, £5, £3, and £2.

1. Robert Taylor, Pitliviie Farm, Carnoustie, "Duchess of Pitliviie 2nd."
2. James M'William, Stonelytown, Keith, "Lady Rose."
3. James M'William, Stonelytown, Keith, "Golden Pride."
4. J. Douglas Fletcher of Rosehaugh, Avoch, "Waterloo Snowflake."
- V. J. Deane Willis, Bapton Manor, Codford, Wilts, "Magnolia."
- H. J. Douglas Fletcher of Rosehaugh, Avoch, "Empress Amazon."
- C. J. Douglas Fletcher of Rosehaugh, Avoch, "Waterloo Winsome."

ABERDEEN-ANGUS.

PRESIDENT'S CHAMPION MEDAL for best Aberdeen-Angus Animal.

T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Maramere" (18,160).

Best Bull of any age in Classes 7, 8, and 9—Ballindalloch Challenge Cup, value £50, given by Sir George Macpherson Grant, Bart.

T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Maramere" (18,160).

Breeder of best Bull of any age in Classes 7, 8, and 9—The Silver Medal.

Alexander M'Laren, Auchnagie, Ballinluig, Perthshire.

Best Breeding Animal of the Breed in the Shropshire—Champion Gold Medal, given by the Polled Cattle Society.

T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Maramere" (18,160).

Breeder of the Winner of the Ballindalloch Challenge Cup—Silver Medal.

Alexander M'Laren, Auchnagie, Ballinluig, Perthshire.

CLASS 7. BULL, calved before 1st December 1900.—Premiums, £15, £10, £5, and £3.

1. T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Maramere" (18,160).
2. George R. Sharp, Bardrill, Blackford, Perthshire, "Enterprise of Advie" (19,069).
3. George R. Sharp, Bardrill, Blackford, Perthshire, "Just Rover of Morlich II." (18,000).

4. John Ritchie Finllay of Aberlour, "Performer of Aberlour" (17,018).
- V. W. S. Ferguson, Kinochtry, Coupar-Angus, "Echador" (16,190).
- H. Sir Donald Currie, G.C.M.G., of Garth and Glenlyon, Fortingall, "Lord Fearless" (18,086).
- C. W. S. Ferguson, Kinochtry, Coupar-Angus, "Jugurtha of Kinochtry" (16,727).

CLASS 8. BULL, calved on or after 1st December 1900.—
Premiums, £15, £10, £5, and £3.

1. Claude Hamilton, of Sundrum, Ayr, "Margrave of Ballindalloch" (19,445).
2. W. S. Ferguson, Kinochtry, Coupar-Angus, "Ballo" (18,755).
3. Charles Edward Hunter, Selaby, Gainford, Darlington, "Examiner of Selaby" (19,107).
4. Charles Calder, Woodhill, by Ponteland, Newcastle-on-tyne, "Ellendale" (19,013).
- V. Hum Bland, Kilquade, Greystones, "Evasit" (19,104).

CLASS 9. BULL, calved on or after 1st December 1901.—
Premiums, £12, £8, £4, and £2.

1. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Ebbero" (20,399).
2. W. Shaw Adamson, of Careston Castle, Brechin, "Ruskin" (20,222).
3. Alexander M'Laren, Auchnaguite, Ballinluig, "Ellalo" (20,442).
4. James Kennedy, of Doonholm, Ayr, "Evarra" (20,507).
- V. Alexander M'Laren, Auchnaguite, Ballinluig, "Flying Fox" (20,557).
- H. Robert C. Barton, Glendalough House, Annanoe, "Jolly Jack" (20,702).
- C. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Prince."

*Best Cow of any age in Class 10—Ballindalloch Challenge Cup, value £50,
given by the late Mr C. Macpherson Grant of Drumduan.*

- T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Neat Nellie" (29,426).

Breeder of the Winner of the Ballindalloch Challenge Cup—Silver Medal.
Archibald Whyte, Inverquhar, Kirriemuir.

CLASS 10. COW, of any age.—Premiums, £12, £8, £4, and £2.

1. T. H. Bainbridge, Eshott Hall, Felton, Northumberland, "Neat Nellie" (29,426).
2. James Kennedy of Doonholm, Ayr, "Quines" (29,951).
3. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Esmeralda 3rd of Wester Fowls" (34,680).
4. His Majesty the King, Balmoral Castle, Ballater, "Gwendolin" (29,499).
- V. W. S. Ferguson, Kinochtry, Coupar-Angus, "Opening Rose" (28,303).
- H. George Willsher, Pitpointie, Auchterhouse, "Vegetable of Knapperna 4th" (30,918).
- C. William Wilson, Coynachie, Gartly, N.B., "Pride 5th of Coynachie" (29,488).

CLASS 11. HEIFER, calved on or after 1st December 1900.—
Premiums, £10, £5, £3, and £2.

1. J. Ernest Kerr, Harviestoun, Dollar, "Princess Pansy" (32,181).
2. William Wilson, Coynachie, Gartly, N.B., "Coynachie Ruth 3rd" (33,010).
3. James Kennedy of Doonholm, Ayr, "Myrica" (32,175).
4. William Wilson, Coynachie, Gartly, N.B., "Pride of Coynachie 7th" (33,021).
- V. Sir Donald Currie, G.C.M.G., of Garth and Glenlyon, Fortingall, "Princess Josephine" (31,608).
- H. W. S. Ferguson, Kinochtry, Coupar-Angus.
- C. Robert Forbes, Woodhead, Kinloss, "Patroness 4th" (31,859).

CLASS 12. HEIFER, calved on or after 1st December 1901.—
Premiums, £10, £5, £3, and £2.

1. J. Ernest Kerr, Harviestoun, Dollar, "Pride of Powrie 14th."
2. His Majesty the King, Balmoral, Ballater, "Princess Alberta 2nd of Abergeldie" (33,045).
3. His Majesty the King, Balmoral, Ballater, "Freelady" (33,014).
4. James Kennedy of Doonholm, Ayr, "Erna" (34,049).
- V. Alexander M'Laren, Auchnaguite, Ballinluig, "Marena" (34,257).

GALLOWAY.

PRESIDENT'S CHAMPION MEDAL for best Galloway.

John Cunningham, Tarbreoch, Dalbeattie, "Lady Harden 2nd of Durhamhill" (14,354).

Best Galloway Bull in Classes 13, 14, and 15—£10, 10s., given by the Galloway Cattle Society.

Cecil Randolph Dudgeon, Cargen, Dumfries, "Chief 2nd of Stepford" (8336).

Breeder of best Bull of any age in Classes 13, 14, and 15—The Silver Medal.

David Brown, Stepford, Auldgrith, Dumfries.

CLASS 13. BULL, calved before 1st December 1900.—
Premiums, £15, £10, £5, and £3.

1. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Excelsior" (7702).
2. Thomas Graham, Marchfield, Dumfries, "George Frederick of Marchfield" (8366).
3. William Baibour, Troquhain, New-Galloway, "Mackenzie of Kilquhanity" (7863).
4. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill, "Earl of Annandale" (8050).
- V. Robert J. Calwell, 21 Arthur Street, Belfast, "Bondsmen" (7306).

Extra Stock.

The following was Very Highly Commended, and a Medium Silver Medal awarded.

David Brown, Stepford, Auldgrith, Dumfries, Bull, "Camp-Follower of Stepford" (7476).

CLASS 14. BULL, calved on or after 1st December 1900.—
Premiums, £15, £10, £5, and £3.

1. Cecil Randolph Dudgeon, Cargen, Dumfries, "Chief 2nd of Stepford" (8336).
2. James Wilson, Tundergarth Main, Lockerbie, "War Cry" (8236).
3. Robert Watson, Stonehouse, Hayton, Carlisle, "Harden 5th of Damhead" (8321).
4. Robert Graham, Auchengassel, Twynholm, "Defender of Garliestown" (8273).
- V. Thomas Graham, Marchfield, Dumfries, "Marchfield Joe" (8629).

CLASS 15. BULL, calved on or after 1st December 1901.—
Premiums, £12, £8, £4, and £2.

1. John Cunningham, Tarbreoch, Dalbeattie, "Starlight of Thorniehill" (8550).
2. Thomas Graham, Marchfield, Dumfries, "Grandee" (8449).
3. James Wilson, Tundergarth Main, Lockerbie, "Woodland Prince" (8772).
4. Thomas Graham, Marchfield, Dumfries, "Creator" (8692).
- V. John Richardson, Trailhatt, Lochmahon, "Comorin of Drumhughry" (8535).

Best Female Galloway in Classes 16, 17, and 18—£10, 10s., given by the Galloway Cattle Society.

John Cunningham, Tarbreoch, Dalbeattie, "Lady Harden 2nd of Durhamhill" (14,354).

CLASS 16. COW, of any age.—Premiums, £12, £8, £4, and £2.

1. John Cunningham, Tarbreoch, Dalbeattie, "Lady Harden 2nd of Durhamhill" (14,354).
2. Cecil Randolph Dudgeon, Cargen, Dumfries, "Trilby of Castlemilk" (15,902).
3. Major Wedderburn Maxwell of Glenlair, Dalbeattie, "Luxury 3rd of Tarbreoch" (13,925).
4. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Flora Macdonald" (16,422).
- V. Robert Graham, Auchengassel, Twynholm, "Violet 3rd of Cally" (13,787).
- H. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Belinda 2nd of Hensol" (16,509).

- C. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill, "Pride 14th of Drumlanrig" (11,666).
 C. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill, "Lady Margaret 2nd of Drumlanrig" (16,318).
 C. Walter Montgomerie Neilson of Queenshill, Ringford, "Jane Stanley 6th" (15,751).

CLASS 17. HEIFER, calved on or after 1st December 1900.—
 Premiums, £10, £5, £3, and £2.

1. Walter Montgomerie Neilson of Queenshill, Ringford, "Joan of Queenshill" (17,454).
 2. Thomas Graham, Marchfield, Dumfries, "Genetive" (17,228).
 3. Cecil Randolph Dudgeon, Cargen, Dumfries, "Lady Love" (17,318).
 4. Robert Wilson, Kilquhanity Farm, Dalbeattie, "Doris of Kilquhanity" (16,912).
 V. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Lady Stanley 14th of Chapelton" (17,236).
 H. Walter Montgomerie Neilson of Queenshill, Ringford, "Barbara of Queenshill" (17,453).
 C. John Blackley, Marchhill, Dumfries, "First Choice" (17,951).
 C. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill, "Fairy Queen 6th of Drumlanrig" (16,856).
 C. Robert Graham, Auchengassel, Twynholm, "Dora of Kirkconnel" (17,177).
 C. A. B. Matthews, Newton-Stewart, "Knockstocks Annie Laurie 2nd" (16,901).

CLASS 18. HEIFER, calved on or after 1st December 1901.—
 Premiums, £10, £5, £3, and £2.

1. David Brown, Lower Stepford, Auldirth, Dumfries, "Lady Scott of Stepford" (17,528).
 2. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Lady Stanley 16th of Chapelton" (17,403).
 3. John Cunningham, Tarbreoch, Dalbeattie, "Maggie Lauder of Tarbreoch" (17,466).
 4. Hugh Fraser, Arkland, Dalbeattie, "Lady Grace 3rd" (17,485).
 V. Thomas Biggar & Sons, Chapelton, Dalbeattie, "Lizzie of Chapelton" (17,418).
 H. A. B. Matthews, Newton-Stewart, "Knockstocks Maud 1st" (17,450).
 C. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill, "Pride 28th of Drumlanrig" (17,570).
 C. Cecil Randolph Dudgeon, Cargen, Dumfries, "Madonna of Cargen" (17,748).
 C. Major Wedderburn Maxwell of Glenlair, Dalbeattie, "Christinas Rose of Glenlair" (17,751).
 C. H. Voigt, North Wakefield, Carlisle, "Belle of Lowry Hill" (17,950).

HIGHLAND.

PRESIDENT'S CHAMPION MEDAL for best Highland Animal.

The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "King Alaric" (1712).

Breeder of best Bull of any age in Classes 19, 20, and 21—The Silver Medal.

The Earl of Southesk, K.T., Kinnaird Castle, Brechin.

CLASS 19. BULL, calved before 1901.—Premiums, £15, £10, £5, and £3.

1. W. J. Nimmo, Castle Elen, Co. Durham, "Carrington" (1327).
 2. Kenneth M'Donnell of Logan, Ardwell, Stranraer, "Uilleam of Farr" (1747).

CLASS 20. BULL, calved in 1901.—Premiums, £15, £10, £5, and £3.

1. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "King Alaric" (1712).
 2. D. A. Stewart, Ensay, Obbe, Portree, "Morair-nan-Eilean."
 3. Sir R. A. E. Cathcart, Bart. of Carlton, Cluny Castle, Aberdeenshire, "Valerius" (1753).
 4. John Ronald Moreton Macdonald, Largie Castle, Tayinloan, Argyllshire, "Laochan-na-Larhaidh."
 V. James D. Graham, Airthrey Castle, Bridge of Allan, "Donnachadh Coin."

CLASS 21. BULL, calved in 1902.—Premiums, £12, £8, £4, and £2.

1. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Fear Bhata of Atholl."
2. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Prince Collin."
3. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Rough Alpin."
4. A. D. & D. McGregor, Kinlochmoidart, Moidart, R.S.O., "Grigair."
- V. John Ronald Moreton Macdonald, Largie Castle, Tayinloan, Argyllshire, "Rob Ban-na-Laragaidh."
- H. John Ronald Moreton Macdonald, Largie Castle, Tayinloan, Argyllshire, "Ian Riabhach-na-Laragaidh."

CLASS 22. COW, of any age, in Milk, or with Calf at Foot.—Premiums, £12, £8, £4, and £2.

1. D. A. Stewart, Ensay, Olhie, Portree, "Laochag Bhuidhe I." (4289).
2. Thomas Valentine Smith of Ardtornish, Morvern, Argyllshire, "Sgiathach 15th" (3809).
3. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Beauty IV. of Atholl" (4449).
4. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, "Cassandra" (3813).
- V. W. J. Nimmo, Castle Eden, Co. Durham, "Mholach of Ardtornish."
- H. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Mairi Bhuidhe of Atholl" (4450).
- C. Thomas Valentine Smith, of Ardtornish, Morvern, Argyllshire, "Sgiathach 26th of Ardtornish" (4809).

CLASS 23. HEIFER, calved in 1900.—Premiums, £10, £5, £3, and £2.

1. Thomas Valentine Smith of Ardtornish, Morvern, Argyllshire, "Lady Blanche" (5245).
2. Thomas Valentine Smith of Ardtornish, Morvern, Argyllshire, "Mairi Bhuidhe V. of Ardtornish" (5249).
3. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Bean Odhar of Atholl."
4. The Duke of Atholl, K.T., Blair Castle, Blair-Atholl, "Bheadrach 1st of Atholl."
- V. A. D. & D. McGregor, Kinlochmoidart, Moidart, R.S.O., Inverness-shire, "Sobhrag."

CLASS 24. HEIFER, calved in 1901.—Premiums, £10, £5, £3, and £2.

1. Thomas Valentine Smith of Ardtornish, Morvern, Argyllshire, "May Queen."
2. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, N.B., "Princess Morella."
3. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, N.B., "Princess Selina."
4. James D. Graham, Airthrey Castle, Bridge of Allan, "Guanach Riabhach I. of Airthrey."
- V. The Earl of Southesk, K.T., Kinnaird Castle, Brechin, N.B., "Princess Alma."
- H. A. D. & D. McGregor, Kinlochmoidart, Moidart, R.S.O., "Finnan."
- C. James D. Graham, Airthrey Castle, Bridge of Allan, "Duhba-a Glinne I. of Airthrey."

AYRSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Ayrshire.

Alexander Cross, Knockdon, Maybole, "Blood II." (12,797).

Best Ayrshire Bull in the Showyard, entered with a number in the Ayrshire Cattle Herd-Book—Champion Prize of £10, given by the Ayrshire Cattle Herd-Book Society.

James Howie, Hillhouse, Kilmarnock, "Gentleman John of Hillhouse" (1934).

Breeder of best Bull of any age in Classes 25, 26, and 27—The Silver Medal.

John S. Hunter, Fulton, Monkton.

CLASS 25. BULL, calved before 1901.—Premiums, £12, £8, and £4.

1. Andrew Mitchell, Barcheskie, Kirkcudbright, "Doch-an-Doras" (4928).
2. Crichton Royal Institution, Crichton Estate, Dumfries, "General White" (4250).
3. William Murray, Borrowmoss, Wigtown, "Still Another" (4023).

CLASS 26. BULL, calved in 1901.—Premiums, £10, £7, and £3.

1. James Howie, Hillhouse, Kilmarnock, "Gentleman John of Hillhouse" (4934).
2. Andrew Mitchell, Barcheskie, Kirkcudbright, "Barony Model."
3. William Murray, Borrowmoss, Wigtown, "Very Likely" (5388).
- V. Robert Osborne, Morton Mains, Thornhill, "Hochmagandie" (5141).

CLASS 27. BULL, calved in 1902.—Premiums, £8, £5, and £3.

1. James Howie, Hillhouse, Kilmarnock, "Erin-go-Draw" (5346).
2. James Howie, Hillhouse, Kilmarnock, "Pearl Stone" (5376).
3. Andrew Slater, Hartburn, Kirkcudbright, "Royal Imperial."
- V. Andrew Mitchell, Barcheskie, Kirkcudbright, "May King."
- H. Robert Osborne, Morton Mains, Thornhill, "Wayntlete."

Best Ayrshire Female in the Showyard, entered with a number in the Ayrshire Cattle Herd-Book—Champion Prize of £10, given by the Ayrshire Cattle Herd-Book Society.

Alexander Cross, Knockdon, Maybole, "Blood II." (12,797).

CLASS 28. COW, calved before 1900, in Milk.—Premiums, £12, £8, and £4.

1. Alexander Cross, Knockdon, Maybole, "Blood II." (12,797).
2. William Murray, Borrowmoss, Wigtown, "Gem of Borrowmoss" (14,731).
3. Thomas C. Lindsay, Aitkenbrae, Monkton, "Snowball of Aitkenbrae" (12,594).
- V. Andrew Mitchell, Barcheskie, Kirkcudbright, "Gay Lass 3rd of Holehouse" (13,846).

CLASS 29. COW in Milk, calved after 1st January 1900.—Premiums, £10, £7, and £3.

1. James M'Alister, Meikle Kilmory, Rothesay, "Bloomer of Kilmory."
2. Charles Duncan, Little Kilmory, Rothesay, "Governess."
3. Alexander Cross, Knockdon, Maybole, "Prinrose XI." (13,804).
- V. Lieut.-Col. G. J. Fergusson-Buchanan of Auchentorlie, Bowling, "Lady Anne."
- H. Charles Duncan, Little Kilmory, Rothesay, "Princess."
- C. A. & W. Kerr, Old Graitney, Greta, "Old Graitney Soncie 5th" (15,653).

CLASS 30. COW of any age, in Calf, or HEIFER calved in 1900, in Calf and due to calve within nine months after the Show.—Premiums, £10, £7, and £3.

1. Thomas Brown, Drum, Thornhill, "Duchess 5th of Drum."
2. Alexander Cross, Knockdon, Maybole, "Sloth II." (12,801).
3. Crichton Royal Institution, Crichton Estate, Dumfries, "Favourite 2nd" (12,967).
- V. Robert Wilson, Manswrae, Bridge of Weir, "Mayflower X. of Manswrae" (12,429).
- H. James M'Alister, Meikle Kilmory, Rothesay, "Pennylands."
- C. A. & W. Kerr, Old Graitney, Greta, "Gay Lass of Old Graitney" (14,840).

CLASS 31. HEIFER, calved in 1901.—Premiums, £10, £5, and £3.

1. Robert Osborne, Morton Mains, Thornhill, "Aldowie" (15,519).
2. Andrew Mitchell, Barcheskie, Kirkcudbright, "Lady Lomond" (15,037).
3. Alex. Y. Allan, Croftjane, Thornhill, "Miss Gibson."
- V. Sir Mark J. M'Taggart Stewart, Bart., M.P., Southwick, Dumfries, "Miss Margaret" (16,007).
- H. Alex. Y. Allan, Croftjane, Thornhill, "Dinah 17th."

CLASS 32. HEIFER, calved in 1902.—Premiums, £8, £5, and £3.

1. James Howie, Hillhouse, Kilmarnock, "Flower of the Corn 2nd."
2. Andrew Mitchell, Barcheskie, Kirkcudbright, "Maid Marion."
3. James Howie, Hillhouse, Kilmarnock, "Howie's Sweet Monica" (16,209).
- V. Andrew Mitchell, Barcheskie, Kirkcudbright.
- H. Lieut.-Col. G. J. Fergusson-Buchanan of Auchentorlie, Bowling, "Scylla."
- C. Robert Osborne, Morton Mains, Thornhill, "Emathla."

HORSES

FOR AGRICULTURAL PURPOSES.

DRAUGHT STALLIONS.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Stallion.

A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Everlasting" (11,331).

Breeder of best Male Animal of any age in Classes 33 to 36—The Silver Medal.

W. M. Wood, Purston Hall, Pontefract.

CLASS 33. STALLION, foaled before 1900.—Premiums, £20, £15, £10, and £4.

1. Seaham Harbour Stud, Ltd., The Dene, Seaham Harbour, "Silver Cup" (11,184).
2. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron's Chief" (10,971).
3. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Acme" (10,485).
4. Wm. Dunlop, Dunure Mains, Ayr, "Dunure Castle" (11,028).
- V. Matthew Marshall, Bridgebank, Stranraer, "Baron Kitchener" (10,499).
- H. Peter Crawford, Dargavel, Dumfries, "Baron Primrose" (10,980).
- C. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Aerial Prince" (10,665).
- C. Thos. Smith, Blacon Point, Chester, "Drumflower" (10,537).

CLASS 34. ENTIRE COLT, foaled in 1900.—Premiums, £20, £15, £10, and £4.

1. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Everlasting" (11,331).
2. W. S. Park, Hatton, Bishopton, "Royal Chattan" (11,489).
3. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron Style" (11,613).
4. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron Romeo" (11,266).
- V. John M'Donald, Boquhanran, Dalmuir, "Lord Radnor."

CLASS 35. ENTIRE COLT, foaled in 1901.—Premiums, £20, £12, £8, and £4.

1. William Clark, Netherlea, Cathcart, "Baron's Best."
2. George Alston, Louloun Hill, Darvel, "Ravelanta."
3. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Durbar" (11,695).
4. William Dunlop, Dunure Mains, Ayr, "Dunure Freeman."
- V. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Premier Pride" (11,345).
- H. Peter Crawford, Dargavel, Dumfries, "Storm King" (11,957).
- C. William Clark, Netherlea, Cathcart, "Douglas Chief."
- C. Malcolm Currie, Stubblebroomhill, Kirkintilloch, "British Leader."

CLASS 36. ENTIRE COLT, foaled in 1902.—Premiums, £15, £10, £6, and £4.

1. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright, "Baron Fergus."
2. A. & W. Montgomery, Netherhall and Banks, Kirkcudbright.
3. William Clark, Netherlea, Cathcart.
4. Richard Dunn, Udston, Hamilton, "Baron Cartly."
- V. William Taylor, Park Mains, Renfrew.
- H. John M'Nee, Afton House, Crief.
- C. William Crawford, Whiteside, Kirkgunzeon, "Greg's Kyle."

DRAUGHT GELDINGS.

PRESIDENT'S CHAMPION MEDAL for best Draught Gelding.

George Johnstone, jun., potato merchant, Airdrie, "Conqueror."

CLASS 37. DRAUGHT GELDING, foaled before 1900.—
Premiums, £10, £5, and £3.

1. David Hastie & Sons, Stonefield Farm, Blantyre, "Sir George."
2. William Clark, Netherlea, Cathcart.
3. William Crawford, Whiteside, Kirkgunzeon, "Whiteside Tommy."

CLASS 38. DRAUGHT GELDING, foaled in 1900.—Premiums, £6, £4, and £3.

1. George Johnstone, jun., potato merchant, Airdrie, "Conqueror."
2. David Hastie & Sons, Stonefield Farm, Blantyre, "Wattie."
3. A. & W. Kerr, Old Graitney, Gretna, "Johnnie."
- V. George Broatch, Thwaite, Ruthwell, "Dandy."

CLASS 39. DRAUGHT GELDING, foaled in 1901.—Premiums, £6, £4, and £3.

1. William Clark, Netherlea, Cathcart,
2. C. Graham, Skipmyre, Lochmaben, "Prince."
3. James Lamont, Ingleston, Irongray, Dumfries.
- V. J. S. McIntosh, Drummur, Ruthwell, R.S.O., "Ned."
- H. George Hodgson, Carlston, Carlisle, "Champion."
- C. Homer Young, Redhills, Dumfries, "Prince."

DRAUGHT MARES AND FILLIES.

PRESIDENT'S CHAMPION MEDAL for best Clydesdale Mare or Filly.

Thomas Smith, Blacon Point, Chester, "Cedric Princess."

Best Mare or Filly registered in the Clydesdale Stud-Book—Cawdor Challenge Cup,
value 50 guineas, given by the Clydesdale Horse Society.

Thomas Smith, Blacon Point, Chester, "Cedric Princess."

Breeder of Best Clydesdale Brood Mare—The Robert Murdoch Prize, value £10.

A. Thomson, Barmear, Stranraer.

CLASS 40. MARE, of any age, with Foal at foot.—
Premiums, £20, £12, £7, and £4.

1. J. Ernest Kerr, Harviestoun, Dollar, "Lady Garnet."
2. Sir John Gilmour, Bart. of Lundin and Montrave, Leven, "Lady Maud."
3. T. & R. Dickson, Braehead, Collin, Dumfries, "Lady Kyle."
4. J. Ernest Kerr, Harviestoun, Dollar, "Baron's Blossom."
- V. Crichton Royal Institution, Crichton Estate, Dumfries.

CLASS 41. YELD MARE, foaled before 1900 —Premiums, £12, £9, £6, and £4.

1. Thomas Smith, Blacon Point, Chester, "Cedric Princess."
2. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Pomona."
3. St Clair Cunningham, Hedderwick Hill, Dunbar, "White Heather."
4. His Majesty the King, Balmoral, Ballater. N.B., "Bessie Lee" (14,462).
- V. Thomas Smith, Blacon Point, Chester, "Beauties Queen."

CLASS 42. YELD MARE or FILLY, foaled in 1900.—
Premiums, £12, £9, £6, and £4.

1. Thomas Smith, Blacon Point, Chester, "Gladys."
2. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Pyrene."
3. James Crawford, Flishend, Gretna, "Countess of Gretna."
4. Thomas Smith, Blacon Point, Chester, "Chester Princess."

CLASS 43. FILLY, foaled in 1901.—Premiums, £12, £9, £6, and £4.

1. Thomas Smith, Blacon Point, Chester, "Baroness of Bargany."
2. Henry Gray, Hawkhill, Kincardine-on-Forth, "Nellie."
3. St Clair Cunningham, Hedderwick Hill, Dunbar, "Heather Bloom."

4. A. B. Matthews, Newton-Stewart.
- V. J. Douglas Fletcher of Rosehaugh, Avoch, "Baroness Macgregor."
- H. Captain John Hope, R.N., of St Mary's Isle, Kirkcudbright, "Montrave Sapphire."
- C. Sir John Gilmour of Lundin and Montrave, Bart., Leven, "Montrave Rena."
- C. Wm. Dunlop, Dunure Mains, "Evelyn Wood."
- C. David P. Elliot, Nisbet Hill, Duns, "Baron's Beauty."

CLASS 44. FILLY, foaled in 1902.—Premiums, £12, £9, £6, and £4.

1. James Gray, Birkenwood, Gargunnoch, "Lady Madge."
2. Thomas Smith, Blacon Point, Chester, "Jewell."
3. George Graham, Faraway Farm, Kippen Station, "Flora Lee."
4. Richard Dunn, Udston, Hamilton, "Katerina."
- V. William M'Connell, Glasnick, Kirkcovan, "Baroness of Glasnick."
- H. Matthew Marshall, Bridgebank, Stranraer.
- C. John Easton, Brownfield, Dumfries, "Blossom of Brownfield."

HUNTERS.

PRESIDENT'S CHAMPION MEDAL for best Hunter.

Alexander Cross, Langbank, Renfrewshire, Mare, "Blitz."

Best Hunter Filly in Classes 45, 46, and 47—Gold Medal, value £10, 10s., given by the Hunter Improvement Society.

T. Taylor Scott, 43 Lowther Street, Carlisle, Filly, "Actress" (2264).

CLASS 45. COLT, GELDING, or FILLY, foaled in 1902, the produce of thorough-bred Stallions, out of Mares of any breed.—Five Prizes—£10, £7, £5, £2, and £1, given by Sir John Gilmour of Montrave, Bart.

1. Captain G. D. Clayhills Henderson, R.N., of Invergowrie, Dundee, Colt, "Blair."
2. Charles Erskine, The Priory, Melrose, Filly, "Queenie."
3. John James, Manor House, Oughterside, Maryport, Gelding.
4. John W. J. Paterson, Terrona, Langholm, Filly, "Glensamo."
5. Michael Young, Currock House, Carlisle, Filly.
- H. J. C. Martin, of Netherwood, Dumfries, Filly, "Eva."
- C. J. P. & T. Carlisle, Milnholm, Langholm, Gelding, "Dan."

CLASS 46. FILLY, MARE, or GELDING, for field, foaled in 1901, *in hand*.—Premiums, £8, £5, and £3.

1. Lewis Beattie, Mosknowe, Canonbie, Gelding, "Rainbow."
2. John James, Manor House, Oughterside, Maryport, Gelding.
3. John James, Manor House, Oughterside, Maryport, Filly, "Lady Belle" (1212).
- V. W. O. Bell-Irving, Millbank, Lockerbie, Mare.
- H. Hugh Neilson, Chapelton, Stewarton, Ayrshire, Gelding, "Joe."
- C. Mrs Mackie, Auchencairn, Castle-Douglas, Gelding, "Solway."

CLASS 47. YELD MARE, FILLY, or GELDING, for field, foaled in 1900, *in hand*.—Premiums, £8, £5, and £3.

1. Major J. M'Kie of Ernespie, Castle-Douglas, Gelding, "The Dutchman."
2. John Scott, Milkvale, Lockerbie, Gelding, "Whitsunday."
3. T. Taylor Scott, 43 Lowther Street, Carlisle, Filly, "Actress."
- V. James Keswick, Halleaths, Lochmaben, Filly, "Wilhelmina."
- H. Michael Young, Currock House, Carlisle, Filly, "Gold Wave."
- C. Sir Reginald Ogilvy of Inverquhar, Bart., Baldovan House, Strathmartine, N.B., Mare, "Cornflower."

CLASS 48. MARE or GELDING, foaled in 1899, able to carry over 13 st. 7 lb.—Premiums, £25, £15, and £8.

1. J. H. Stokes, Nether House, Great Bowden, Market Harboro, Gelding, "Android."
2. J. Harling Turner, Cessnock, Galston, Ayrshire, Gelding, "Cessnock."
3. Archibald Kerr, Mouswald, Townhead, Ruthwell, Gelding, "Daly."

CLASS 49. MARE or GELDING, foaled in 1899, able to carry from 12 st. to 13 st. 7 lb.—Premiums, £20, £10, and £5.

1. J. H. Stokes, Great Bowden, Market Harboro, Gelding, "Red Knight."
2. Major J. M'Kie of Ernespie, Castle-Douglas, Mare, "Christiana."

CLASS 50. MARE or GELDING, foaled before 1899, able to carry over 15 st.—Premiums, £25, £15, and £8.

1. James Baird, Thorneycroft, Netherplace, Mauchline, Gelding, "The Count."
2. J. H. Stokes, Great Bowden, Market Harboro, Gelding.
3. James Baird, Thorneycroft, Netherplace, Mauchline, Gelding, "Arundel."
- V. Archibald Kerr, Mouswald, Townhead, Ruthwell, Gelding, "Swilly."
- II. Michael Young, Currock House, Carlisle, Gelding, "Barney."
- C. C. J. Maitland Makgill-Crichton of Lathrisk, Largo House, Largo, Fife, Gelding, "Juno."

CLASS 51. MARE or GELDING, foaled before 1899, able to carry from 13 st. 7 lb. to 15 st.—Premiums, £30, £15, and £8.

1. Alexander Cross, Langbank, Renfrewshire, Mare, "Blitz."
2. J. H. Stokes, Great Bowden, Market Harboro, Gelding.
3. J. H. Stokes, Great Bowden, Market Harboro, Gelding.
- H. Michael Young, Currock House, Carlisle, Gelding, "Shamrock."
- C. R. C. Scott, Graden, Kelso, Gelding.

CLASS 52. MARE or GELDING, foaled before 1899, able to carry from 12 st. to 13 st. 7 lb.—Premiums, £20, £10, and £5.

1. J. H. Stokes, Great Bowden, Market Harboro, Gelding, "Wild Prince."
2. J. Bell-Irving, Mount Annan, Annan, Gelding, "St Boswells."
3. Archibald Kerr, Mouswald, Townhead, Ruthwell, Mare, "Clashrhue."
- V. John W. J. Paterson, Terrona, Langholm, Mare, "Delamira."
- H. Eric Tayleur, George Street, Dumfries, N.B., Gelding, "Cotswold."
- C. Hugh Neilson, Chapelton, Stewarton, Gelding, "Review."

CLASS 53. HUNTER BROOD MARE, with Foal at Foot or to foal this season.—Premiums, £15, £8, and £4, given by Captain Clayhills Henderson of Invergowie, R.N.

1. Major J. M'Kie of Ernespie, "Maid of the Meynell."
2. Robert Pringle, Essex Park, Dumfries, "Honeymoon III."
3. Wm. Lee Carlyle, Templehill, Ecclefechan, "Dark Night."
- H. Wm. Bell, Wyseby Mains, Ecclefechan, "Fluff."
- C. Jim Beavan, Eglinton Kennels, Kilwinning, "Miss Kate."

HACKNEYS.

(ALL TO BE SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Hackney.

Thomas and Robert Black, Whitewall, Malton, Yorks, "St John" (8290).

Best Mare or Filly in Hackney or Pony Classes—Gold Medal, value £10, given by the Hackney Horse Society.

Alfred A. Haley, Whitewall, Malton, "Lady Millie" (11,153).

CLASS 54. BROOD MARE, 15 hands and upwards, with Foal at Foot or to foal this season to a registered sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Alfred A. Haley, Whitewall, Malton, "Lady Millie" (11,153).
2. Carr & Co., Clyde Vale Hackney Stud, Carlisle, "Lady Henley" (13,615).

CLASS 55. BROOD MARE, under 15 hands, with Foal at Foot or to foal this season to a registered sire. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Mrs Mackie, Auchencairn, Castle-Douglas, "Wilton's Best."
2. John F. Christie, Levenfield, Alexandria, N.B., "Fiona" (10,918).

CLASS 56. YELD MARE or FILLY, foaled in 1900. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. J. Harriott Bell, Rossie, Forgandenny, "Rossie Felicity" (15,387).
2. George Cruddas, Nether Warden, Hexham, Filly, "Rosida" (15,883).
3. George M'Conachie, Cairnfield, Buckie, Filly, "Eliza."

CLASS 57. FILLY, foaled in 1901. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Charles E. Galbraith, Terregles, Dumfries, "Princess Mercedes."

CLASS 58. FILLY, foaled in 1902, eligible for entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Alfred A. Haley, Whitewall, Malton, "Maudora."
2. John F. Christie, Levenfield, Alexandria, N.B., "Kiomil."
3. Carr & Co., Clyde Vale Hackney Stud, Carluke, "Clyde Vale Surprise."

CLASS 59. STALLION, foaled in or before 1900, over 15 hands. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. Thomas & Robert Black, Whitewall, Malton, Yorks, "St John" (8290).
2. Seaham Harbour Stud, Ltd., The Dene, Seaham Harbour, "Grand Master 2nd" (5230).

CLASS 60. STALLION, foaled in or before 1900, over 14.2 and not over 15 hands. Registered in the Hackney Stud-Book.—Premiums, £10, £6, and £4.

1. T. & C. Ross, The Limes, Hedon, near Hull, "Matchless King" (8236).

CLASS 61. ENTIRE COLT, foaled in 1901. Registered in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Arthur Hall, East Farm, Langton, Malton, "Dan Leno."
2. Charles E. Galbraith, Terregles, Dumfries, "Maxim."

CLASS 62. ENTIRE COLT, foaled in 1902, eligible for entry in the Hackney Stud-Book.—Premiums, £8, £5, and £3.

1. Charles E. Galbraith, Terregles, Dumfries, "Shirley Brookes."
2. Wm. M'Allister, The Inverness Hackney Stud, Inverness, N.B., "Inverness Imperialist."
3. J. Harriott Bell, Rossie, Forgandenny, "Sporting Times."

PONIES.

PRESIDENT'S CHAMPION MEDAL for best Pony.

Benjamin Prior, Benton House Stud, Gosforth Park, Newcastle-on-Tyne, "Tom Gordon."

CLASS 63. STALLION, 3 years old and upwards, over 12, not exceeding 14.2 hands, *in hand*.—Premiums, £5, £3, and £2.

1. Benjamin Prior, Benton House Stud, Gosforth Park, Newcastle-on-Tyne. "Tom Gordon."
2. Alfred A. Haley, Whitewall, Malton, "Whitewall"
3. A. Alexander, Cockburn Hill, Balerno, Argh, "Haban."

- V. C. Y. & W. H. Cox Kinloch, Gourlie, Murthly, Perthshire, "Crimson Rambler" (7767).
 II. Lord Arthur Cecil, Orchard Main, Tonbridge, Kent, Arab, "Insuf."
 C. Lord Arthur Cecil, The Mount, Lymington, Hants, Arab, "Gu Labi."

CLASS 64. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 13 and not over 14½ hands, *in saddle*.—Premiums, £5, £3, and £2.

1. John Wotherspoon, Muirhouse, Motherwell, Mare, "Early Bird" (14,287).
 2. David Bell, jun., Hass, Lockerbie, N.B., Mare, "Lady Bell."

CLASS 65. YELD MARE, FILLY, or GELDING, 3 years old and upwards, over 12 and not over 13 hands, *in saddle*.—Premiums, £5, £3, and £2.

1. Robert Irving, Crown and Thistle Hotel, Stanwix (Carlisle), Mare, "Lady Kildare."
 2. J. E. E. Galbraith, Terregles, Dumfries, Gelding, "Orion."
 3. Robert W. Fergusson, Kildunant, Dalbeattie, N.B., Gelding, "Cocoa."
 V. Walter Mitchell & Sons, Main Street, Ayr, Mare.

CLASS 66. STALLION, 3 years old and upwards, 12 hands and under, *in hand*.—Premiums, £5, £3, and £2.

No Entry.

CLASS 67. YELD MARE, FILLY, or GELDING, 3 years old and upwards, 12 hands and under, *in saddle*.—Premiums, £5, £3, and £2.

1. Miss Galbraith, Terregles, Dumfries, Gelding, "Jack."
 2. John Blackley, Marchhill, Dumfries, Mare, "Tibby."
 3. Mrs W. G. Lowther, Rockville, Maxwelltown, Dumfries, Mare, "Tiny."

HIGHLAND PONIES.

PRESIDENT'S CHAMPION MEDAL for best Highland Pony.

Donald Stewart, Drumchorrie, Pitlochry, "Moss Crop" (256).

SILVER MEDAL, given by the Polo Pony Society.

Donald Stewart, Drumchorrie, Pitlochry, "Moss Crop" (256).

Best Stallion in Class 68—Special Prize of £5, 5s., given by the Polo Pony Society.

J. H. Munro Mackenzie of Calgary, Isle of Mull, "Islesman" (253).

CLASS 68. HIGHLAND PONY STALLION, 3 years old or upwards, not exceeding 14.2 hands, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book.—Premiums, £5, £3, and £2.

J. H. Munro Mackenzie of Calgary, Isle of Mull, "Islesman" (253).

EXTRA STOCK.

The following was Very Highly Commended, and a Medium Silver Medal awarded.
 Donald Stewart, Drumchorrie, Pitlochry, "Moss Crop" (256).

Best Mare in Class 69—Special Prize of £5, 5s. and Silver Medal, given by the Polo Pony Society.

Lord Arthur Cecil, The Mount, Lymington, Hants, "Duchess."

CLASS 69. HIGHLAND PONY MARE, 3 years old or upwards, not exceeding 14.2 hands, Yeld or with Foal at foot, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book.—Premiums, £5, £3, £2.

1. Lord Arthur Cecil, The Mount, Lymington, Hants, "Duchess."
 2. Miss Norah Mackenzie, Calgary, Isle of Mull, "Boisdals" (1296).

SHETLAND PONIES.

(ALL TO BE SHOWN IN HAND.)

PRESIDENT'S CHAMPION MEDAL for best Shetland Pony.

George A. Miller, Lawmuir, Methven, "Beatrice" (1533).

Best Pony in Class 70—Silver Medal given by the President of the Shetland Pony Stud-Book Society.

R. W. R. Mackenzie, Earlishall, Leuchars, "Monkshood."

CLASS 70. STALLION, not exceeding 10½ hands, foaled before 1900.—
Premiums, £5, £3, and £2.

1. R. W. R. Mackenzie, Earlishall, Leuchars, "Monkshood."
2. William Mungall of Transy, Dunfermline, "Hector" (183).
3. George A. Miller, Lawmuir, Methven, "Havelock" (241).

Best Pony in Classes 71 and 74—Special Prize of £7, given by the President of the Shetland Pony Stud-Book Society.

R. W. R. Mackenzie, Earlishall, Leuchars, "Bellman."

CLASS 71. ENTIRE COLT, not exceeding 10½ hands, foaled in 1900 or 1901.—
Premiums, £5, £3, and £2.

1. R. W. R. Mackenzie, Earlishall, Leuchars, "Bellman."
2. William Mungall of Transy, Dunfermline, "Seaweed."
3. William Mungall of Transy, Dunfermline, "Dauntless."

Best Pony in Classes 72 and 73—Silver Medal given by the President of the Shetland Pony Stud-Book Society.

George A. Miller, Lawmuir, Methven, "Beatrice" (1533).

CLASS 72. MARE, not exceeding 10½ hands, with Foal at foot.—
Premiums, £5, £3, and £2.

1. George A. Miller, Lawmuir, Methven, "Beatrice" (1533).
2. William Mungall of Transy, Dunfermline, "Fearnought."
3. William Little, Gladenholm, Amisfield, R.S.O., "Margaret" (906).
- V. Lady Waldie Griffith, Hendersyle Park, Kelso, "Virtuous."

CLASS 73. YELD MARE, not exceeding 10½ hands.—Premiums, £5, £3, and £2.

1. R. W. R. Mackenzie, Earlishall, Leuchars, "Bracelet."
2. William Little, Gladenholm, Amisfield, R.S.O., "Speedwell."
3. William Mungall of Transy, Dunfermline, "Sea Serpent" (1535).
- V. Miss Dorothy Jardine, Jardine Hall, Lockerbie, "Mayday."

CLASS 74. FILLY, not exceeding 10½ hands, foaled in 1900 or 1901.—
Premiums, £5, £3, and £2.

1. George A. Miller, Lawmuir, Methven, "Ladysmith."
2. William Mungall of Transy, Dunfermline, "Dagmar."
3. R. W. R. Mackenzie, Earlishall, Leuchars, "Blue Bell."
- V. William Little, Gladenholm, Amisfield, R.S.O., "Darzia."

DRIVING COMPETITIONS.

PRESIDENT'S CHAMPION MEDAL for best animal in the Classes for Horses in Harness.

John Wotherspoon, Muirhouse, Motherwell, Gelding, "Patronus" (7215).

CLASS 75. YELD MARE, FILLY, or GELDING, in Harness, 15 hands and upwards, to be driven in the ring.—Premiums, £10, £5, and £3.

1. David Davidson, 21 Queen's Road, Aberdeen, Gelding, "Achilles."
2. Major F. J. Carruthers, Dornmont, Lockerbie, Gelding, "Dan."

CLASS 76. YELD MARE, FILLY, or GELDING, in Harness, under 15 hands, to be driven in the ring.—Premiums, £10, £5, and £3.

1. John Wotherspoon, Muirhouse, Motherwell, Gelding, "Patronus" (7215).
2. Carr & Co., Clyde Vale Hackney Stud, Carlisle, N.B., Mare, "Clyde Vale Princess."
3. George M'Conachie, Cairnfield, Buchie, Filly, "Eliza."

JUMPING COMPETITIONS

Wednesday, 22nd July.

CLASS 1. HORSES or PONIES, any height.—Premiums, £20, £15, £10, £5, and £3.

1. F. V. Grange, Oak House, Farndon, Cheshire, Gelding, "Rufus."
2. F. V. Grange, Oak House, Farndon, Cheshire, Gelding, "Hardcash."
3. James Nodwell, New George Hotel, Dumfries, Gelding, "High Life."
4. Mrs Blockley, Moor Hall, Madeley, Staffs, Gelding, "Omega."
5. L. Irwin Scott, Lisanelly, Omagh, Co. Tyrone, Mare, "Brownberry."

Thursday, 23rd July.

CLASS 2. HORSES or PONIES, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1.—Premiums, £10, £8, £5, £3, and £2.

1. Mrs Blockley, Moor Hall, Madeley, Staffs, Gelding, "Omega."
2. J. Wheeler, Shakespeare Farm, Studley, Mare, "Confidence."
3. James Nodwell, New George Hotel, Dumfries, Gelding, "High Life."
4. F. V. Grange, Oak House, Farndon, Cheshire, Gelding, "Hardcash."
5. L. Irwin Scott, Lisanelly, Omagh, Co. Tyrone, Mare, "Brownberry."

Friday, 24th July.

CLASS 3. HORSES or PONIES, any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2.—Premiums, £10, £8, £5, £3, and £2.

1. James Nodwell, New George Hotel, Dumfries, Gelding, "High Life."
2. J. Wheeler, Shakespeare Farm, Studley, Mare, "Confidence."
3. L. Irwin Scott, Lisanelly, Omagh, Co. Tyrone, Mare, "Brownberry."
4. F. V. Grange, Oak House, Farndon, Cheshire, Gelding, "Hardcash."
5. Dalgety Brothers, Park Place, Dundee, Gelding, "The Joker."

Champion Prize of £10 for most points in Prizes with one or more Horses in above Classes—First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; and Fifth Prize, one point—the money to be evenly divided in the event of a tie.

F. V. Grange, Oak House, Farndon, Cheshire.

SHEEP

BLACKFACED

PRESIDENT'S CHAMPION MEDAL for best Pen of Blackfaced Sheep

John Miller, Lambhill Strathven

Best pen up of five Blackfaced Rams any age, owned and fed by Exhibitor since 1st January 1903, shown in either Class 77 or Class 78—1st Prize, Gold Medal, 2nd, Silver Medal, given by Mr Howatson of Glenbuck

- 1 James Hamilton Woolfords, Cobbinshaw
- 2 Calzow Brothers, Borland Biggar, and Stonehill, Abington

CLASS 77 TUP, above one Shear —Premiums, £12, £8, £4, and £2

- 1 Calzow Brothers, Borland Biggar, and Stonehill Abington "Burgher"
- 2 James Hamilton Woolfords, Cobbinshaw
- 3 J Archibald, Overshield Stew
- 4 J Archibald, Overshield Stew
- V John Miller Lambhill Strathven
- H Charles Howatson of Glenbuck
- C John Craig Innergellie, Comrie

CLASS 78 SHEARLING TUP —Premiums, £12, £8, £4, and £2

- 1 Charles Howatson of Glenbuck
- 2 James Hamilton, Woolfords, Cobbinshaw
- 3 James Hamilton, Woolfords, Cobbinshaw
- 4 Calzow Brothers, Borland Biggar, and Stonehill, Abington
- V Calzow Brothers, Borland, Biggar, and Stonehill, Abington
- H Charles Howatson of Glenbuck
- C James Hamilton, Woolfords, Cobbinshaw

CLASS 79 EWE, above one Shear, with her Lamb at foot —
Premiums, £10, £5, and £2

- 1 John Miller Lambhill Strathven
- 2 D A McArthur Nurserie Alington
- 3 D A McArthur Nurserie Alington
- V John Craig, Innergellie, Comrie
- H Calzow Brothers, Borland Biggar, and Stonehill, Abington
- C John Craig, Innergellie, Comrie

CLASS 80 SHEARLING EWE or GIMMER —Premiums, £10, £5, and £2

- 1 John Miller, Lambhill Strathven
- 2 John Craig, Innergellie, Comrie
- 3 James A Gordon, Airdrie, Nigg Station Bess Shire (L 61)
- V Calzow Brothers, Borland, Biggar, and Stonehill Alington
- H Thomas Rawlinson Park House Killybegs Londale
- C Calzow Brothers, Borland Biggar, and Stonehill, Abington

CHEVIOT

PRESIDENT'S CHAMPION MEDAL for best Pen of Cheviot Sheep

John Elliot, Hindhope, Jedburgh

Challenge Cup, value £25, for best Sheep in the Cheviot Classes—Given by the Cheviot Sheep Society

John Elliot, Hindhope, Jedburgh

CLASS 81. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. John Elliot, Hindhope, Jedburgh.
2. John A. Johnstone, Archbank, Moffat.
3. John Elliot, Hindhope, Jedburgh.
4. Jacob Robson, Byrness, Otterburn, Northumberland, "Dead Nuts."
- V. James Moffat, Craick, Hawick, "Head Lambie."
- H. John Elliot, Hindhope, Jedburgh.
- C. Jacob Robson, Byrness, Otterburn, Northumberland, "Lord of the Marches."

CLASS 82. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. John Elliot, Hindhope, Jedburgh.
2. John Robson, Newton, Bellingham.
3. John Robson, Newton, Bellingham.
4. Matthew S. M'Kerrow, Boreland of Southwick, Dumfries.
- V. John Elliot, Hindhope, Jedburgh.
- H. John Elliot, Hindhope, Jedburgh.
- C. J. R. C. Smith, Mowhaugh, Yetholm, Kelso.

CLASS 83. EWE, above one Shear, with her Lamb at foot.—
Premiums, £10, £5, and £2.

1. John Robson, Newton, Bellingham.
2. Matthew S. M'Kerrow, Boreland of Southwick, Dumfries.
3. John Elliot, Hindhope, Jedburgh.
- V. John Elliot, Hindhope, Jedburgh.
- H. Jacob Robson, Byrness, Otterburn, Northumberland.
- C. John Robson, Newton, Bellingham.

CLASS 84. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. J. R. C. Smith, Mowhaugh, Yetholm, Kelso.
2. John Elliot, Hindhope, Jedburgh.
3. Matthew S. M'Kerrow, Boreland of Southwick, Dumfries.
- V. John Robson, Newton, Bellingham.
- H. J. R. C. Smith, Mowhaugh, Yetholm, Kelso.

BORDER LEICESTER.

PRESIDENT'S CHAMPION MEDAL for best Pen of Border Leicesters.

David Hume, Barrelwell, Brechin.

CLASS 85. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. T. M'Intosh, Knowhead, Brechin.
2. Matthew Templeton, Sandyknowe, Kelso, "Historian."
3. Robert Wallace, Auchenbrain, Mauchline, "C. I."
4. Robert Wallace, Auchenbrain, Mauchline, "Walter" (971).
- V. Andrew Mitchell, Barcheskie, Kirkcudbright.
- H. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Dalmeny Mertoun £100" (617).
- C. Matthew Templeton, Sandyknowe, Kelso, "Blackfoot."

CLASS 86. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. David Hume, Barrelwell, Brechin.
2. Thomas Clark, Oldhamstocks Mains, Cockburnspath.
3. Matthew Templeton, Sandyknowe, Kelso.
4. Robert Wallace, Auchenbrain, Mauchline.
- V. Thomas Clark, Oldhamstocks Mains, Cockburnspath.
- H. J. & J. R. C. Smith, Galalaw, Kelso.
- C. Robert Wallace, Auchenbrain, Mauchline.

CLASS 87. EWE, above one Shear.—Premiums, £10, £5, and £2.

1. The Right Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk.
2. William Scott, Thornhome, Carlisle, B 4 (BL 22).

3. J. & J. R. C. Smith, Galalaw, Kelso.

V. The Duke of Buccleuch and Queensberry, K.G., K.T., Dalkeith Park, Dalkeith.

V. The Right Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk.

CLASS 88. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. William Scott, Thornhome, Carluke, E 1 (BL 42).

2. David Hume, Barrelwell, Brechin.

3. Thomas Clark, Oldhamstocks Mains, Cockburnspath.

V. David Hume, Barrelwell, Brechin.

V. Robert Wallace, Auchendrain, Mauchline.

H. The Right Hon. A. J. Balfour, M.P., Whittingehame, Prestonkirk.

C. The Duke of Buccleuch and Queensberry, K.G., K.T., Dalkeith Park, Dalkeith.

HALF-BRED.

PRESIDENT'S CHAMPION MEDAL for best Pen of Half-Breds.

James A. W. Mein, Hunthill, Jedburgh.

CLASS 89. TUP, above one Shear.—Premiums, £12, £8, £4, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.

2. John Bertram, Addinston, Lauder.

3. James A. W. Mein, Hunthill, Jedburgh.

CLASS 90. SHEARLING TUP.—Premiums, £12, £8, £4, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.

2. James A. W. Mein, Hunthill, Jedburgh.

3. John Bertram, Addinston, Lauder.

4. Robert Dickinson, Longcroft, Lauder.

V. Robert Dickinson, Longcroft, Lauder.

CLASS 91. EWE, above one Shear.—Premiums, £10, £5, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.

2. James A. W. Mein, Hunthill, Jedburgh.

CLASS 92. SHEARLING EWE or GIMMER.—Premiums, £10, £5, and £2.

1. James A. W. Mein, Hunthill, Jedburgh.

2. John Bertram, Addinston, Lauder.

3. James A. W. Mein, Hunthill, Jedburgh.

SHROPSHIRE.

PRESIDENT'S CHAMPION MEDAL for best Pen of Shropshires.

Alfred Tanner, Shrawardine, Shrewsbury.

CLASS 93. TUP, above one Shear.—Premiums, £6, £4, and £2.

1. Alfred Tanner, Shrawardine, Shrewsbury.

2. George Russell, Hatton, Lundin Links, "Hatton Rose" (10,739).

3. Thomas A. Buttar, Corston, Coupar-Angus.

V. Thomas A. Buttar, Corston, Coupar-Angus.

CLASS 94. SHEARLING TUP.—Premiums, £6, £4, and £2.

1. Alfred Tanner, Shrawardine, Shrewsbury.

2. Thomas A. Buttar, Corston, Coupar-Angus.

3. Alfred Tanner, Shrawardine, Shrewsbury.

V. Thomas A. Buttar, Corston, Coupar-Angus.

H. Thomas A. Buttar, Corston, Coupar-Angus.

C. Thomas A. Buttar, Corston, Coupar-Angus.

C. Thomas A. Buttar, Corston, Coupar-Angus.

CLASS 95. EWE, above one Shear.—Premiums, £5, £3, and £2.

1. Alfred Tanner, Shrawardine, Shrewsbury.
2. Alfred Tanner, Shrawardine, Shrewsbury.

CLASS 96. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1. Alfred Tanner, Shrawardine, Shrewsbury.
2. Alfred Tanner, Shrawardine, Shrewsbury.
3. George Russell, Hatton, Lundin Links.
- H. George Russell, Hatton, Lundin Links.

OXFORD DOWNS.

PRESIDENT'S CHAMPION MEDAL for best Pen of Oxford Downs.

James T. Hobbs, Maisey Hampton, Fairford, Gloucester.

CLASS 97. SHEARLING TUP.—Premiums, £6, £4, and £2.

1. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
2. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
3. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
- H. William Elliot, Raecleugh Head, Duns, "Berwickshire Lad."
- C. James Fleming, Redkirk, Rigg, S.O., Carlisle, "Prince."

CLASS 98. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2

1. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
2. James T. Hobbs, Maisey Hampton, Fairford, Gloucester.
3. William Elliot, Raecleugh Head, Duns, "Langton Lass."
- V. William Elliot, Raecleugh Head, Duns, "Langton Lady."
- H. James Fleming, Redkirk, Rigg, S.O., Carlisle, "Princess."

SUFFOLK.

PRESIDENT'S CHAMPION MEDAL for best Pen of Suffolk Sheep.

Lieut.-Colonel E. W. Baird, Exning House, Newmarket.

CLASS 99. SHEARLING TUP.—Premiums, £6, £4, and £2.

1. Lieut.-Colonel E. W. Baird, Exning House, Newmarket.

CLASS 100. SHEARLING EWE or GIMMER.—Premiums, £5, £3, and £2.

1. Lieut.-Colonel E. W. Baird, Exning House, Newmarket.
2. Lieut.-Colonel E. W. Baird, Exning House, Newmarket.
3. Lieut.-Colonel E. W. Baird, Exning House, Newmarket.

CLASS 101. THREE EWE LAMBS.—Premiums, £5, £3, and £2,
given by the Suffolk Sheep Society.

1. Lieut.-Colonel E. W. Baird, Exning House, Newmarket.
2. William Kennedy, Luce Mains, Ecclefechan.

EXTRA SECTIONS.

Best Pens of Cross-bred Lambs in Class 102 got by a Shropshire Tup—Prizes of £5, £3, and £2, given by Scotch Breeders of Shropshire Sheep, per Mr T. A. Buttar.

1. Alexander Anderson, Berryhill, Dundee (Shropshire Tup and Dorset Horn Ewes).
2. Alexander Anderson, Berryhill, Dundee (Shropshire Tup and Dorset Horn Ewes).

Best Pen of Lambs in Class 102 got by a Suffolk Tup, and out of Cheriot or Black-faced Ewes—Prize of £5, given by the Suffolk Sheep Society.

Robert Allan, Howell, Kirkcubright (Suffolk Tup and Half-bred Ewes).

Best Pen of Lambs in Class 102 got by a Suffolk Tup, and out of Border Leicester, Half-bred, or Three-parts-bred Ewes—Prize of £5, given by the Suffolk Sheep Society.

George Willsher, Pitpointie, Dundee (Suffolk Tup and Border Leicester Ewes).

Best Pens of Cross-bred Lambs in Class 103 got by an Oxford Down Tup—Prizes of £5, £3, and £2, given by Oxford Down Sheep-Breeders' Association.

James Fleming, Redkirk, Ragg, S.O., Carlisle (Oxford Down Tup and Half-bred Ewes).

CLASS 102. Five FAT LAMBS, any Breed or Cross, dropped in the year of the Show.—Premiums, £5 and £3.

1. George Willsher, Pitpointie, Dundee (Suffolk Tup and Border Leicester Ewes).
2. Alexander Anderson, Berryhill, Dundee (Shropshire Tup and Dorset Horn Ewes).
- H. Alexander Anderson, Berryhill, Dundee (Shropshire Tup and Dorset Horn Ewes).
- C. James Fleming, Redkirk, Ragg, S.O., Carlisle (Oxford Down Tup and Half-bred Ewes).

WOOL

BLACKFACE WOOL.

CLASS 103. BLACKFACE WETHER WOOL, five Fleeces.—Premiums, £3, £2, and £1, given by the late Sir Robert Menzies, Bart.

1. James S. Reid, Penchrise, Hawick.

CLASS 104. BLACKFACE EWE WOOL, five Fleeces.—Premiums, £3, £2, and £1, given by the late Sir Robert Menzies, Bart.

1. James S. Reid, Penchrise, Hawick.
2. Thomas V. Smith, Ardtornish, Morvern, Argyllshire.
3. Thomas V. Smith, Ardtornish, Morvern, Argyllshire.

CLASS 105. BLACKFACE EWE or WETHER HOGG WOOL, five Fleeces.—Premiums, £3, £2, and £1, given by the late Sir Robert Menzies, Bart.

1. Thomas V. Smith, Ardtornish, Morvern, Argyllshire.
2. The Duke of Buccleuch and Queensberry, K.G., K.T., Drumlanrig Castle, Thornhill.
3. Thomas V. Smith, Ardtornish, Morvern, Argyllshire.

CLASS 106. BLACKFACE EWE WOOL, best adapted for rent-paying purposes. Single Fleecce.—Premiums, £1, 10s. and Medal, £1, 15s., 10s., and 5s., given by the Blackface Sheep-Breeders' Association.

1. Col. R. C. Mackenzie, Muirhouse Farm, Duntocher. Weight, 10 lb.
2. James Lumsden of Arden, Arden, Dumbartonshire. Weight, 8½ lb.
3. D. A. Macarthur, Nunnerie, Abington. Weight, 9½ lb.
4. James S. Reid, Penchrise, Hawick. Weight, 8½ lb.
- V. D. A. Macarthur, Nunnerie, Abington. Weight, 8 lb.
- H. James Lumsden of Arden, Arden, Dumbartonshire. Weight, 7½ lb.
- C. Thomas V. Smith, Ardtornish, Morvern, Argyllshire. Weight, 7½ lb.

CLASS 107. BLACKFACE EWE HOGG or WETHER HOGG WOOL, best adapted for rent-paying purposes. Single Fleecce.—Premiums, £1, 10s. and Medal, £1, 15s., 10s., and 5s., given by the Blackface Sheep-Breeders' Association.

1. Thomas V. Smith, Ardtornish, Morvern, Argyllshire. Weight, 9 lb.
2. Thomas V. Smith, Ardtornish, Morvern, Argyllshire. Weight, 8½ lb.
3. D. A. Macarthur, Nunnerie, Abington. Weight, 8½ lb.
4. D. A. Macarthur, Nunnerie, Abington. Weight, 8 lb.
- V. Col. R. C. Mackenzie, Muirhouse Farm, Duntocher. Weight, 8 lb.
- H. James Lumsden of Arden, Arden, Dumbartonshire. Weight, 7½ lb.
- C. James Lumsden of Arden, Arden, Dumbartonshire. Weight, 7½ lb.

SWINE

PRESIDENT'S CHAMPION MEDAL for best Pen of Swine.

- R. Millington Knowles, Colston Bassett Hall, Bingham, Notts., "Colston Lass" (11,216).

LARGE WHITE BREED.

CLASS 108. BOAR.—Premiums, £5 and £3.

1. The Earl of Roseberry, K.G., Dalmeny Park, Edinburgh, "Dalmeny General" (5927).
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Turk IV." (6089).
- V. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Peterborough Turk" (6525).
- C. R. Millington Knowles, Colston Bassett Hall, Bingham, Notts., "Vanguard."

CLASS 109. SOW.—Premiums, £5 and £3.

1. R. Millington Knowles, Colston Bassett Hall, Bingham, Notts., "Colston Lass" (11,216).
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Sowerby Beauty" (9690).
- V. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh, "Borrowfield Sunbeam XIII." (8612).
- H. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Countess X." (11,704).
- C. Crichton Royal Institution, Crichton Estate, Dumfries.

CLASS 110. Three PIGS, not above 8 months old.—Premiums, £4 and £2

1. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh.
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington.
- V. Sanders Spencer, Holywell Manor, St Ives, Hunts.
- H. Sanders Spencer, Holywell Manor, St Ives, Hunts.
- C. William B. Wallace, Broomhouse Farm, Corstorphine.

WHITE BREED OTHER THAN LARGE.

CLASS 111. BOAR.—Premiums, £5 and £3.

1. Sanders Spencer, Holywell Manor, St Ives, Hunts, "Holywell Viscount."
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Gappenhall Wicks" (6707).

CLASS 112. SOW.—Premiums, £5 and £3.

1. Sir Gilbert Greenall, Bart., Walton Hall, Warrington, "Walton Rose XVII." (12,008).
2. Sanders Spencer, Holywell Manor, St Ives, Hunts, "Holywell Victoria Curly."

CLASS 113. Three PIGS, not above 8 months old.—Premiums, £4 and £2.

1. Sanders Spencer, Holywell Manor, St Ives, Hunts.
2. Sir Gilbert Greenall, Bart., Walton Hall, Warrington.

BERKSHIRE.

CLASS 114. BOAR.—Premiums, £5 and £3.

1. J. Jefferson, Peel Hall, Chester, "Manor Favourite" (7605).
2. J. Jefferson, Peel Hall, Chester, "Peel Tom."

CLASS 115. SOW.—Premiums, £5 and £3.

1. J. Jefferson, Peel Hall, Chester, "Peel Florie" (7334).
2. J. Jefferson, Peel Hall, Chester, "Peel Joan" (8751).

CLASS 116. Three PIGS, not above 8 months old.—Premiums, £4 and £2.

1. J. Jefferson, Peel Hall, Chester.
2. J. Jefferson, Peel Hall, Chester.

POULTRY

First Premium—*One Sovereign*. Second Premium—*Ten Shillings*. Where there are Six or more Entries, Third Premium—*Five Shillings*.

CHAMPION MEDALS.

1. *Best Cock, any variety.*

C. Sneddon, Kirkham, Lancashire.

2. *Best Hen, any variety.*

Walter Firth, Rea, near Blackburn.

3. *Best Cockerel, any variety.*

Viscount Deerpur, Dyne Hall, Halstead, Essex.

4. *Best Pullet, any variety.*

Alexander M. Prain, Rawes, Longforan.

5. *Best Pen of Ducks.*

The Countess of Home, The Hesel, Coldstream.

6. *Best Pen of Geese.*

F. G. S. Rawson, Thorpe, Halifax, Yorkshire (Emden).

7. *Best Pen of Turkeys.*

James Caldwell, Craighead, by Girvan (Bronze).

CLASS 1. DORKING—Coloured. Cock.

1. A. K. Crichton, Estates Office, Bridge of Wau, Renfrewshire.
2. Viscount Deerpur, Dyne Hall, Halstead, Essex.
3. Mrs. Shanks, Cuthellon Farm, Denny.
- V. Alexander M. Prain, Rawes, Longforan.
- H. George Anderson, Crimongorth, Crimond, Peterhead.
- C. Mrs. Mordaunt Lawson, Evening Hill Poultry Farm, near Carlisle.

CLASS 2. DORKING—Coloured. Hen.

1. Viscount Deerpur, Dyne Hall, Halstead, Essex.
2. Viscount Deerpur, Dyne Hall, Halstead, Essex.
3. John Gilhe, Elington Mills, Chinnside.
- V. The Countess of Home, The Hesel, Coldstream.
- H. George Anderson, Crimongorth, Crimond, Peterhead.
- C. Mary A. Bothwick, Blackmark, Duh, Galloway.

CLASS 3. DORKING—Coloured. Cockerel.

1. Viscount Deerpur, Dyne Hall, Halstead, Essex.
2. C. Sneddon, Kirkham, Lancashire.
- V. Mrs. Mordaunt Lawson, Evening Hill Poultry Farm, near Carlisle.

CLASS 4. DORKING—Coloured. Pullet.

1. Alexander M. Prain, Rawes, Longforan.
2. Viscount Deerpur, Dyne Hall, Halstead, Essex.
3. The Countess of Home, The Hesel, Coldstream.
- V. Mrs. Mordaunt Lawson, Evening Hill Poultry Farm, near Carlisle.
- H. C. Sneddon, Kirkham, Lancashire.
- C. Mrs. Mordaunt Lawson, Evening Hill Poultry Farm, near Carlisle.

CLASS 5. DORKING—Silver Grey. Cock.

1. C. Sneddon, Kirkham, Lancashire.
2. George M'Bain, Linkwood, Elgm.
3. John Howie, Boghead, Craigie, Kilmarnock.
- V. John Mechie, jun., Auchtermuchty.
- H. John Howie, Boghead, Craigie, Kilmarnock.
- C. Viscount Deerpurth, Dynes Hall, Halstead, Essex.

CLASS 6. DORKING—Silver Grey. Hen.

1. A. K. Crichton, Estates Office, Bridge of Weir, Renfrewshire.
2. John Howie, Boghead, Craigie, Kilmarnock.
3. The Earl of Rosebery, K.G., Dalmeny Park, Edinburgh.
- V. Viscount Deerpurth, Dynes Hall, Halstead, Essex.
- H. John Mechie, jun., Auchtermuchty.
- C. Thomas Rae, Craighlaw, Kirkcubbin.

CLASS 7. DORKING—Silver Grey. Cockerel.

1. C. Sneddon, Kirkham, Lancashire.
2. Viscount Deerpurth, Dynes Hall, Halstead, Essex.
3. Charles Aitkenhead, Stud Farm, Seaham Harbour.
- V. Alexander Cross of Knockdon, Maybole.
- H. The Countess of Home, The Hirsell, Coldstream.
- C. John Howie, Boghead, Craigie, Kilmarnock.

CLASS 8. DORKING—Silver Grey. Pullet.

1. Alexander Cross of Knockdon, Maybole.
2. Charles Aitkenhead, Stud Farm, Seaham Harbour.
3. C. Sneddon, Kirkham, Lancashire.
- V. James Reid, Kilnhaugh, Auchtermuchty.
- H. Viscount Deerpurth, Dynes Hall, Halstead, Essex.
- C. Alexander Munro, Ivereshie, Kincraig.

CLASS 9. COCHIN-CHINA. Cock.

1. John Ferguson, 7 North Inglis Street, Dunfermline.
2. Robert M'Millan, spirit merchant, Saltcoats.
- V. Robert M'Millan, spirit merchant, Saltcoats.

CLASS 10. COCHIN-CHINA. Hen.

1. Robert M'Millan, spirit merchant, Saltcoats.
2. Robert M'Millan, spirit merchant, Saltcoats.
- V. John Walker, 13 Front Lebanon, Cupar-Fife.

CLASS 11. BRAHMAPOOTRA. Cock.

1. George Archibald, Bleho Craigs, by Cupar-Fife.
2. Thomas Garner, Wraes Mill, Neilston.
- V. Tennyson Fawkes, Hammond's Farm, Stroud.
- H. P. Castle, Bonnyrigg.

CLASS 12. BRAHMAPOOTRA. Hen.

1. John Walker, 13 Front Lebanon, Cupar-Fife.
2. G. C. Taylor, The Grove, Downfield, Dundee.
3. P. Castle, Bonnyrigg.
- V. The Countess of Home, The Hirsell, Coldstream.
- H. John Page, Waterside, Callander.
- C. P. Castle, Bonnyrigg.

CLASS 13. BRAHMA or COCHIN. Cockerel.

1. P. Castle, Bonnyrigg (Brahma).
2. A. K. Crichton, Estates Office, Bridge of Weir, Renfrewshire (Brahma).

CLASS 14. BRAHMA or COCHIN. Pullet.

1. A. K. Crichton, Estates Office, Bridge of Weir, Renfrewshire (Brahma).
2. P. Castle, Bonnyrigg (Brahma)
- V. P. Castle, Bonnyrigg (Brahma).

CLASS 15. SCOTCH GREY. Cock.

Entry not forward.

CLASS 16. SCOTCH GREY. Hen.

1. David Hastings, Glaister Cottage, Darvel.
2. John M'Retson, Uddingston, Douglas.

CLASS 17. SCOTCH GREY. Cockerel.

1. James Gegg, Bank Foot, Inverkip, Renfrewshire.
2. The Hon. I. M. Campbell, Cawdor Castle, Nairn.
3. John M'Retson, Uddingston, Douglas.
- V. The Hon. I. M. Campbell, Cawdor Castle, Nairn.

CLASS 18. SCOTCH GREY. Pullet

1. David Hastings, Glaister Cottage, Darvel.
2. The Hon. I. M. Campbell, Cawdor Castle, Nairn.
3. The Hon. I. M. Campbell, Cawdor Castle, Nairn.

CLASS 19. HAMBURG—Black. Cock.

1. W. W. Bentley, 1 Corberry Terrace, Maxwelltown, Dumfries.
2. H. Pickles, Kayfield House, Earby, Colne.
3. H. Pickles, Kayfield House, Earby, Colne.

CLASS 20. HAMBURG—Black. Hen.

1. H. Pickles, Kayfield House, Earby, Colne.
2. H. Pickles, Kayfield House, Earby, Colne.
3. W. W. Bentley, 1 Corberry Terrace, Maxwelltown, Dumfries.
- V. William Kerr, Bandedeath, Stirling.

CLASS 21. HAMBURG—Any other Variety. Cock.

1. H. Pickles, Kayfield House, Earby, Colne.
2. Park & Mitchell, Knockshinnoch Cottage, New Cumnock (Silver-pencilled).
- V. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).

CLASS 22. HAMBURG—Any other Variety. Hen

1. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
2. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
- V. Malcolm M'Kinnon, East King Street, Paisley (Pencilled).

CLASS 23. HAMBURG—Any Variety. Cockerel.

1. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
2. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
- V. William Kerr, Bandedeath, Stirling (Silver-spangled).
- H. Malcolm M'Kinnon, East King Street, Paisley (Pencilled).

CLASS 24. HAMBURG—Any Variety. Pullet.

1. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
2. H. Pickles, Kayfield House, Earby, Colne (Silver-spangled).
- V. The Countess of Home, The Hirsell, Coldstream (Black).

CLASS 25. PLYMOUTH ROCK. Cock.

1. Robert Waddell, Barnsdale Poultry Farm, St Ninians.
2. Alexander Strang, Low Pleasance, Larkhall.
3. H. Pickles, Kayfield House, Earby, Colne.
- V. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder.

CLASS 26. PLYMOUTH ROCK. Hen.

1. Alexander M. Prain, Rawes, Longforgan.
2. E. W. Allouby, Sandscale, Dalton-in-Furness, Lancashire.
3. Robert Waddell, Barnsdale Poultry Farm, St Ninians.
- V. Robert Waddell, Barnsdale Poultry Farm, St Ninians.

CLASS 27. PLYMOUTH ROCK. Cockerel.

1. Viscount Deerpurst, Dynes Hall, Halstead, Essex.
2. C. Sneddon, Kirkham, Lancashire.
3. Duncan M'Millan, Old Smithy, Drymen.

CLASS 28. PLYMOUTH ROCK. Pullet.

1. Viscount Deerpurst, Dynes Hall, Halstead, Essex.
2. Robert Waddell, Barnsdale Poultry Farm, St Ninians.
3. E. W. Allouby, Sandscale, Dalton-in-Furness, Lancashire.
- V. C. Sneddon, Kirkham, Lancashire.
- H. John Sibson, Longthwaite House, Wigton, Cumberland.

CLASS 29. MINORCA. Cock.

1. Josiah Wright, Locharbriggs, Dumfries.
2. John Gillies, Edington Mill, Chirnside.
3. James Douglas, 11 Loreburn Street, Dumfries.
- V. James M'Ewan, 59 M'Neil Street, Larkhall.

CLASS 30. MINORCA. Hen.

1. Wanlock Wilson, "Glendyne," South Park Road, Hamilton.
2. James M'Ewan, 59 M'Neil Street, Larkhall.
3. Alexander M. Prain, Rawes, Longforgan.
- V. John Rickerby, Monkhill Mill, Carlisle.

CLASS 31. MINORCA. Cockerel.

1. William Weir, Midtown, Newabbey.
2. Robert Edgar, Bield, Wamphray.
- V. The Countess of Home, The Hirsell, Coldstream.

CLASS 32. MINORCA. Pullet.

1. James Stark, 32 Waterloo Road, Lanark.
2. The Countess of Home, The Hirsell, Coldstream.
- V. William Weir, Midtown, Newabbey.

CLASS 33. LEGHORN—White. Cock.

1. Weir Brothers, Newabbey Road, Dumfries.
2. Alexander M. Prain, Rawes, Longforgan.
- V. Mrs Mordaunt Lawson, Evening Hill Poultry Farm, Carlisle.

CLASS 34. LEGHORN—White. Hen.

1. John King, Rodenbain, Hollybush, by Ayr.
2. John King, Rodenbain, Hollybush, by Ayr.
3. Alexander M. Prain, Rawes, Longforgan.
- V. Weir Brothers, Newabbey Road, Dumfries.
- H. H. G. Dunlop, Waterloo Cottage, New Prestwick, Ayr.
- C. John Skinner, Forth Bank, Kirkcaldy.

CLASS 35. LEGHORN—Any other Variety. Cock.

1. Alexander M. Prain, Rawes, Longforgan (Brown).
2. George M'Alpine, Townhead, Meikle Earnock (Brown).

CLASS 36. LEGHORN—Any other Variety. Hen.

1. David Mealls, jun., Dunipace, Denny (Brown).
2. William Keys, Kintore, Aberdeenshire (Brown).
- V. David Mealls, jun., Dunipace, Denny (Brown).

CLASS 37. LEGHORN—Any Variety. Cockerel.

1. Dickson Brothers, Mouswald, Ruthwell, R.S.O. (White).
2. Weir Brothers, Newabbey Road, Dumfries (White).
3. J. Skinner, Forth Bank, Kirkcaldy (Brown).
- V. Weir Brothers, Newabbey Road, Dumfries (White).
- H. Alexander M. Prain, Rawes, Longforgan.

CLASS 38. LEGHORN—Any Variety. Pullet.

1. James Howieson, Firdale, Causewayend, Linlithgow (White).
2. Dickson Brothers, Mouswald, Ruthwell, R.S.O. (White).
- V. Alexander M. Prain, Rawes, Longforgan (White).
- H. Weir Brothers, Newabbey Road, Dumfries (White).

CLASS 39. LANGSHAN. Cock.

1. T. Haxton & Sons, Bankfold, Auchterarder.
2. Mrs Hart, Croft Terrace, Selkirk.
- V. Andrew Stillie, Heatherlie, Selkirk.
- H. T. Haxton & Sons, Bankfold, Auchterarder.

CLASS 40. LANGSHAN. Hen.

1. T. Haxton & Sons, Bankfold, Auchterarder.
2. Mary Borthwich, Blackmark, Dalry, Galloway.

CLASS 41. ORPINGTON. Cock.

1. Alexander M. Prain, Rawes, Longforgan.
2. Tennyson Fawkes, Hammond's Farm, Stroud.
3. Mrs J. Whitehead, 14 Tower Street, Selkirk.
- V. William Morgan, Balcurvie, by Windygates, Fife.
- H. J. Clarkson, jun., The Green, Silsden, *via* Keighley, Yorkshire.
- C. C. Sneddon, Kirkham, Lancashire.

CLASS 42. ORPINGTON. Hen.

1. J. Clarkson, jun., The Green, Silsden, *via* Keighley, Yorkshire.
2. Robert Waddell, Barnsdale Poultry Farm, St Ninians.
3. Alexander M. Prain, Rawes, Longforgan.
- V. J. & M. Carr, East Castle, Annfield Plain, Co. Durham.
- H. H. Carlin, Mount Cottage, by Kilmarnock.
- C. Tennyson Fawkes, Hammond's Farm, Stroud.

CLASS 43. LANGSHAN or ORPINGTON. Cockerel.

1. Mrs Gillespie, Wyndhead, Lauder (Black Orpington).
2. Archibald Taylor, Edinburgh Cottage, Braeside, Liberton, Mid-Lothian (Buff Orpington).
3. P. Castle, Bonnyrigg (Orpington).
- V. Tennyson Fawkes, Hammond's Farm, Stroud (Black Orpington).
- H. Robert Waddell, Barnsdale Poultry Farm, St Ninians (Buff Orpington).
- C. William Mackie, Woodburn, South Queensferry (Orpington).

CLASS 44. LANGSHAN or ORPINGTON. Pullet.

1. Archibald Taylor, Edinburgh Cottage, Braeside, Liberton, Mid-Lothian (Buff Orpington).
2. Tennyson Fawkes, Hammond's Farm, Stroud (Black Orpington).
3. William Kerr, Summerhill, Holywood, Dumfries (Buff Orpington).
- V. Alexander M. Prain, Rawes, Longforan (Buff Orpington).
- H. Mrs Gillespie, Wyndhead, Lauder (Black Orpington).
- C. C. Sneddon, Kirkham, Lancashire (Buff Orpington).

CLASS 45. WYANDOTTE—Gold or Silver. Cock.

1. H. Pickles, Kayfield House, Earby, Colne (Silver).
2. John Simpson, leather merchant, Buckie (Gold).
- V. William Morgan, Balcurvie, by Windygates, Fife (Silver).
- H. Harry Maidment, Hayton Gate, Low Row, Carlisle (Silver).

CLASS 46. WYANDOTTE—Gold or Silver. Hen.

1. William Morgan, Balcurvie, by Windygates, Fife (Gold).
2. John Love, Armadale Station, Armadale (Silver).
3. H. Pickles, Kayfield House, Earby, Colne (Silver).
- V. John Simpson, leather merchant, Buckie (Gold).
- H. Alexander M. Prain, Rawes, Longforan (Silver).
- C. Alexander Bain, Ashlea, Dalmellington (Gold).

CLASS 47. WYANDOTTE—Any other Variety. Cock.

Tennyson Fawkes, Hammond's Farm, Stroud (Buff).

CLASS 48. WYANDOTTE—Any other Variety. Hen.

1. William Morgan, Balcurvie, by Windygates, Fife (White).
2. Tennyson Fawkes, Hammond's Farm, Stroud (White).

CLASS 49. WYANDOTTE—Any Variety. Cockerel.

1. H. Pickles, Kayfield House, Earby, Colne (Silver).
2. R. Gray, Blaydon Burn, Blaydon-on-Tyne (Buff).
- V. Harry Maidment, Hayton Gate, Low Row, Carlisle (Silver).
- H. John Simpson, leather merchant, Buckie (Gold).

CLASS 50. WYANDOTTE—Any Variety. Pullet.

1. R. Gray, Blaydon Burn, Blaydon-on-Tyne (Silver).
2. John Love, Armadale Station (Silver).
- V. H. Pickles, Kayfield House, Earby, Colne (Silver).
- H. Harry Maidment, Hayton Gate, Low Row, Carlisle (Silver).

CLASS 51. GAME—Old English. Cock.

1. Mrs T. T. Robinson, Blennerhasset, Brayton, S.O., Cumberland.
2. Walter Firth, Read, near Blackburn.
- V. John Hutt, Denend, Cardenden, Fifeshire.
- H. John Hutt, Denend, Cardenden, Fifeshire.

CLASS 52. GAME—Old English. Hen.

1. Walter Firth, Read, near Blackburn.
2. Mrs T. T. Robinson, Brayton, S.O., Cumberland.
- V. W. W. Bentley, 1 Corberry Terrace, Maxwelltown, Dumfries.
- H. John Hutt, Denend, Cardenden, Fifeshire.

CLASS 53. GAME—Indian. Cock.

1. C. Sneddon, Kirkham, Lancashire.
2. R. S. Hunter, Meadowbank House, Tollcross, Glasgow.
3. John Pettigrew, Moss View, Dalmellington.

- V. Walter Firth, Read, near Blackburn.
- H. H. Scott, 28 Trafalgar Street, Greenock.
- C. R. S. Hunter, Meadowbank House, Tollcross, Glasgow.

CLASS 54. GAME—Indian. Hen.

- 1. R. S. Hunter, Meadowbank House, Tollcross, Glasgow.
- 2. C. Sneddon, Kirkham, Lancashire.
- V. R. S. Hunter, Meadowbank House, Tollcross, Glasgow.
- H. Walter Firth, Read, near Blackburn.

CLASS 55. GAME—Modern. Cock.

- 1. C. Sneddon, Kirkham, Lancashire.
- 2. William Melrose, Rosewell Mains, Rosewell (Black Red).
- 3. Walter Firth, Read, near Blackburn.
- V. James Wilson, jun., 75 High Street West, Leslie, Fife (Duckwing).
- H. David Thomson, Three Houses, Auchendinny, Milton Bridge.

CLASS 56. GAME—Modern. Hen.

- 1. Walter Firth, Read, near Blackburn.
- 2. Alexander Shepherd, Lily Cottage, Forfar.
- 3. Frank Anderson, Town Head, Biggar.
- V. C. Sneddon, Kirkham, Lancashire.
- H. David Thomson, Three Houses, Auchendinny, Milton Bridge.

CLASS 57. GAME—Any Variety, including Old English and Indian. Cockerel.

- 1. R. S. Hunter, Meadowbank House, Tollcross, Glasgow (Indian Game).
- 2. Alexander Shepherd, Lily Cottage, Forfar (Modern).
- V. Robert Reid, Glasgow Bridge, Kirkintilloch (Pile).
- H. C. Sneddon, Kirkham, Lancashire (Modern).

CLASS 58. GAME—Any Variety, including Old English and Indian. Pullet.

- 1. R. S. Hunter, Meadowbank House, Tollcross, Glasgow (Indian Game).
- 2. C. Sneddon, Kirkham, Lancashire (Modern).
- H. Robert Reid, Glasgow Bridge, Kirkintilloch (Pile).
- C. Alexander Shepherd, Lily Cottage, Forfar (Modern).

CLASS 59. BANTAM—Game, any Variety, including Old English and Indian. Cock.

- 1. Walter Firth, Read, near Blackburn (Modern).
- 2. C. Sneddon, Kirkham, Lancashire (Modern).
- V. T. Ainsworth, Harecroft, Gostorth, Cumberland (Old English Spangled).
- H. H. Wilkie, Coaltown, Markinch, Fife (Modern).

CLASS 60. BANTAM—Game, any Variety, including Old English and Indian. Hen.

- 1. C. Sneddon, Kirkham, Lancashire (Modern).
- 2. Walter Firth, Read, near Blackburn (Modern).
- V. William Middleton, Royal Terrace, Falkland, Fife (Modern).

CLASS 61. BANTAM—Any other Variety Bantam. Cock.

- 1. John Gillies, Edington Mills, Chirnside (Rosecomb).
- 2. James M'Cuae, 18 Thomson Street, Kilmarnock (Scotch Grey).
- 3. John Young, 12 Albany Gardens, Shettleston, Glasgow (Sebright).
- V. M'Rae & Fulton, Burnside Cottage, New Cumnock (Black Rosecomb).
- H. William Kerr, Banded, Stirling (Black Rosecomb).
- C. Miss Galbraith, Terregles, Dumfries (Buff Cochins).

CLASS 62. BANTAM—Any other Variety Bantam. Hen.

- . James M'Cuae, 13 Thomson Street, Kilmarnock (Black Rosecomb).
- . John Young, 12 Albany Gardens, Shettleston, Glasgow (Sebright).
- . A. K. Crichton, Estates Office, Bridge of Weir, Renfrewshire (Pekin).
- V. H. Pickles, Kayfield House, Earby, Colne (Black Rosecomb).
- II. James M'Ewen, 59 M'Neil Street, Larkhall (Black Pekin).
- C. John Puge, Waterside, Callander (White Polish).

CLASS 63. Any other recognised Breed of Poultry. Cock.

1. David Hasting, Glaister Cottage, Darvel, Ayrshire (Creve).

CLASS 64. Any other recognised Breed of Poultry. Hen.

1. Mrs D. Mackenzie, Maryfield, Meigle (Spanish).
2. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder (Houdan).

CLASS 65. Any other recognised Breed of Poultry. Cockerel.

1. C. Sneddon, Kirkham, Lancashire (Modern Bantam).
2. Mrs D. Mackenzie, Maryfield, Meigle (Spanish).

CLASS 66. Any other recognised Breed of Poultry. Pullet.

1. C. Sneddon, Kirkham, Lancashire (Modern Bantam).
2. Lady Margaret Douglas Home, The Hirsel, Coldstream (Sebright Bantam).
- V. Mrs D. Mackenzie, Maryfield, Meigle (Spanish).
- H. H. Wilkie, Coaltown, Markinch, Fife (Modern Game Bantam).

CLASS 67. TABLE FOWLS—Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points. Pair of Cockerels.

1. The Countess of Home, The Hirsel, Coldstream (Indian Game and Buff Orpington).

CLASS 68. TABLE FOWLS—Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points. Pair of Pullets.

1. The Countess of Home, The Hirsel, Coldstream (Indian Game and Buff Orpington).

CLASS 69. DUCKS—Aylesbury. Drake.

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
- V. John Gillies, Edington Mills, Chirnside.
- H. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder.

CLASS 70. DUCKS—Aylesbury. Duck.

1. The Countess of Home, The Hirsel, Coldstream.
2. John Gillies, Edington Mills, Chirnside.
3. The Countess of Home, The Hirsel, Coldstream.
- V. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder.

CLASS 71. DUCKS—Aylesbury. Drake (Young).

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
- V. John Gillies, Edington Mills, Chirnside.

CLASS 72. DUCKS—Aylesbury. Duck (Young).

1. The Countess of Home, The Hirsel, Coldstream.
2. The Countess of Home, The Hirsel, Coldstream.
- V. John Gillies, Edington Mills, Chirnside.

CLASS 73. DUCKS—Rouen. Drake.

1. John Gillies, Edington Mills, Chirnside.
2. The Countess of Home, The Hirsell, Coldstream.
- V. Alexander Scott, Cockridge Farm, Carstairs.

CLASS 74. DUCKS—Rouen. Duck.

1. The Countess of Home, The Hirsell, Coldstream.
2. John Gillies, Edington Mills, Chirnside.
- V. Dickson Brothers, Mouswald, Ruthwell, R.S.O.

CLASS 75. DUCKS—Any other Variety. Drake.

1. S. Dalgleish, Blackburn, Chirnside (Pekin).
2. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder (Indian Runner).
- V. Mrs Mansell, Crossrigg, Penrith (Pekin).
- H. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder (Pekin).

CLASS 76. DUCKS—Any other Variety. Duck.

1. S. Dalgleish, Blackburn, Chirnside (Pekin).
2. Mrs Mansell, Crossrigg, Penrith (Pekin).
- V. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder (Pekin).
- H. John Butter Malcolm, Auchterarder Castle Prize Poultry Farm, Auchterarder (Pekin).

CLASS 77. DUCKS—Any Breed (Aylesbury excepted). Drake (Young).

1. The Countess of Home, The Hirsell, Coldstream (Rouen).
2. John Gillies, Edington Mills, Chirnside (Rouen).
- V. S. Dalgleish, Blackburn, Chirnside (Pekin).

CLASS 78. DUCKS—Any Breed (Aylesbury excepted). Duck (Young).

1. John Gillies, Edington Mills, Chirnside (Rouen).
2. The Countess of Home, The Hirsell, Coldstream (Rouen).
- V. S. Dalgleish, Blackburn, Chirnside (Pekin).

CLASS 79. GEESE. Gander.

- F. G. S. Rawson, Thorpe, Halifax, Yorkshire (Emden).

CLASS 80. GEESE. Goose.

- F. G. S. Rawson, Thorpe, Halifax, Yorkshire (Emden).

CLASS 81. TURKEYS. Cock.

1. James Caldwell, Craighead, by Girvan (Bronze).
2. F. G. S. Rawson, Thorpe, Halifax, Yorkshire (American Bronze).

CLASS 82. TURKEYS. Hen.

1. F. G. S. Rawson, Thorpe, Halifax, Yorkshire (American Bronze).
2. C. Randolph Dudgeon, Cargen, Dumfries (Bronze).
- V. John Page, Waterside, Callander (Bronze).

DAIRY PRODUCE

CLASS 1. CURED BUTTER, not less than 7 lb.—Premiums, £4, £2, and £1.

1. R. G. Murray, Spittal, Biggar.
2. Andrew Fleming, Threepland, Eaglesham.
3. W. Whyte, Middlepenny, Langbank.
- V. Robert Gilmour, Stonebyres, Eaglesham.
- H. Thomas Gilliland, Grassmillees, Mauchline.
- C. Daniel Gilliland, Kilford, Dundonald.

CLASS 2. POWDERED BUTTER, not less than 7 lb.—Premiums, £4, £2, and £1.

1. William Rennie, Parkhead, Slamannan.
2. Andrew Fleming, Threepland, Eaglesham.
3. Robert Gilmour, Stonebyres, Eaglesham.
- V. R. G. Murray, Spittal, Biggar.
- H. W. Whyte, Middlepenny, Langbank.
- C. Thomas Gilliland, Grassmillees, Mauchline.

CLASS 3. FRESH BUTTER, Three 1-lb. Rolls.—Premiums, £4, £2, and £1.

1. Andrew Fleming, Threepland, Eaglesham.
2. William Rennie, Parkhead, Slamannan.
3. Thomas Gilliland, Grassmillees, Mauchline.
- V. Robert Gilmour, Stonebyres, Eaglesham.
- H. R. G. Murray, Spittal, Biggar.
- C. W. Whyte, Middlepenny, Langbank.

CLASS 4. CHEDDAR CHEESE, 56 lb. and upwards.—
Premiums, £12, £7, £4, £3, £2, and £1.

1. W. P. Gilmour, Balmangan, Kirkcudbright.
2. William M'Culloch, Low Clendrie, Dunragit.
3. James Smith, Standingstone, Twynholm.
4. William Hunter, Garthland Mains, Stranraer.
5. David A. Hood, Balgreddan, Kirkcudbright.
6. James Ferguson, Auchlane Dairy, Castle-Douglas.
- V. James M'Cartney, Kirkcuch, Kirkcudbright.
- H. Stephen Hunter, Whiteleys, Stranraer.
- C. Sir M. J. M'Taggart Stewart, Bart., Southwick Home Farm, Dumfries.

CLASS 5. SWEET-MILK CHEESE. Flat Shape. White in Colour, made according to the Dunlop or other method.—Premiums, £5, £4, £3, and £2.

1. Weir Brothers, Newabbey Road, Dumfries.
2. W. P. Gilmour, Balmangan, Kirkcudbright.
3. George Johnston, Cairnie Hill, Borgue, Kirkcudbright.
4. Alexander M. Stevenson, Jeanfield, Symington, Kilmarnock.
- V. Stephen Hunter, Whiteleys, Stranraer.
- H. Hugh Parker, Boreland, Castle-Douglas.
- C. James Cruickshank, Bombie, Kirkcudbright.

CLASS 6. CHEDDAR CHEESE, 14 lb. and under.—
Premiums, £4, £3, £2, and £1.

1. W. P. Gilmour, Balmangan, Kirkcudbright.
2. Alexander Cross of Knockdon, Maybole.
3. George Johnston, Cairnie Hill, Borgue, Kirkcudbright.
4. David Gibson, Ingliston, Borgue, Kirkcudbright.
- V. Alexander Y. Allan, Croftjane, Thornhill.
- H. Robert Cochran, Portencallie, Kirkcolm, Stranraer.
- C. John M'Harg, Merslaugh, Stranraer.

JUDGES

Shorthorn.—C. M. Cameron, Balnakeyle, Munloch; Alexander Robertson, Haugh of Balechin, Ballinluig.

Aberdeen-Angus.—Colonel M. A. Judy, Williamsport, Indiana, U.S.A.; D. Robertson, Mains of Fordie, Murthly.

Galloway.—James Cranston, Home Farm, Pakenham Hall, Castlepollard, Ireland; John M'Cormick, Lochenkit, Corsock, Dalbeattie.

Highland.—James Cameron, 'Dundee Advertiser,' Bank Street, Dundee; J. R. Campbell, Shinness, Lairg, Sutherland.

Ayrshire.—John Bauchop, Main Street, Alexandria, N.B.; John Cochrane, Nethercraig, Crosshouse, Kilmarnock.

Draught Stallions, Colts, and Geldings.—John M'Caig, Challock, Leswalt, Stranraer; John P. Sleight, St John's Wells, Fyvie.

Draught Mares and Fillies.—Robert Brydon, The Dene, Seaham Harbour; Robert M'Alister, Mid-Ascog, Rothesay.

Hunters.—George Dove, Whitehouse, St Boswells.

Hackneys and Ponies.—H. P. Webster, Stud Farm, Brompton, R.S.O., Yorks.

Highland Ponies.—Sir John Gilmour of Montrave, Bart., Leven.

Shetland Ponies.—Francis N. M. Gourlay, Twomerkland, Moniaive.

Blackfaced.—Alexander Cowan, Spit-

talhill, Fintry, Balfour Station; James Moffat, Gateville, Sanquhar.

Cheviot.—George Douglas, Hindhope, Jedburgh; John Murray, Park Hall, Douglas.

Border Leicester.—John H. Laurie, Harlens, Duns; George Twentyman, Westley, Sparsholt, Winchester.

Half-Bred.—George B. Clark, Marchcleugh, Kelso.

Shropshire.—T. S. Minton, Montford, Shrewsbury.

Oxford Down.—J. H. Toppin, Musgrave Hall, Penrith.

Suffolk.—Chas. T. A. Robertson, Little Horringer Hall, Bury St Edmund.

Fat Sheep.—William Craddock, Helen Bank, Maxwelltown, Dumfries.

Wool.—Classes 103, 104, and 105—Jas. D. Haggart, The Royal Breadalbane Mills, Aberfeldy; Alexander M'Naughton, Pitlochry. Classes 106 and 107—Judges of Blackfaced Sheep.

Swine.—T. S. Minton, Montford, Shrewsbury.

Poultry.—Thomas Fullarton, Loans, Troon (classes 15-58 inclusive); John Meikle, Auchencruive Estates Office, Mount Hamilton, Ayr (classes 1-14 inclusive, and classes 59-82 inclusive).

Dairy Produce.—William M'Fadzean, Wedgewood, Charles St., Kilmarnock.

DISTRICT COMPETITIONS.

21 Districts—Grants of £12 each (Section I.), less £2, 10s. not awarded	£237	10	0
13 " Grants of £15 each (Section II.)	195	0	0
8 " Special Grants	80	0	0
89 " Medals for Shows	56	14	9
30 " Medals for Cottages and Gardens	7	5	0
206 " Medals for Ploughing, 1902-3	49	15	8
367	£206	5	5

VETERINARY DEPARTMENT.

33 Silver Medals	£21	0	9
------------------	-----	---	---

ABSTRACT OF PREMIUMS.

Dumfries Show	£2703	3	1
District Competitions, 1903	626	5	5
Veterinary Colleges	21	0	9
	£3350	9	3

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY

OF SCOTLAND

As at 30th NOVEMBER 1903.

I. CONSOLS—			
£2,000 2½ per cent Consols at 88½			£1,777 10 0
II. HERITABLE BONDS—			
£11,000 at 3½ per cent, £19,500 at 3½ per cent, £4,000 at 3 per cent			34,500 0 0
III. DEBENTURE AND PREFERENCE STOCKS—			
£5,850 N.E. Railway Co. 3 per cent, at 96	£5,616 0 0		
£2,727 Caled. Railway Co. 4 per cent, at 125½	3,422 7 8		
£2,347 London and North-Western Railway Company 3 per cent, at 97½	2,288 6 6		
£1,212 Mid. Railway Co. 2½ per cent, at 80	969 12 0		
£2,400 Do. do. Preference Stock 2½ per cent, at 75	1,800 0 0		
£2,086 N.E. Railway Co. 3 per cent, at 96½	1,964 14 9		
£2,026 Gt. N. Railway Co. 3 per cent, at 95½	1,934 16 7		
			17,995 17 6
IV. BANK STOCKS*—			
£6,407 7 8 Royal Bank of Scotland, at 261½	£16,755 6 1		
£2,218 16 5 Bank of England, at 317½	7,044 15 2		
£2,500 0 0 British Linen Co. Bank, at 492	12,300 0 0		
£2,341 13 4 Bank of Scotland, at 360½	8,435 17 6		
			44,535 18 9
TOTAL AMOUNT OF INVESTED FUNDS			£98,809 6 3
V. ESTIMATED VALUE of Building, No. 3 George IV. Bridge		£3,100 0 0	
VI. ESTIMATED VALUE of Furniture, Paintings, Books, &c.		1,000 0 0	
			4,100 0 0
VII. ARREARS OF SUBSCRIPTIONS considered recoverable			113 6 0
VIII. BALANCE DUE BY ROYAL BANK OF SCOTLAND ON ACCOUNTS CURRENT at 30th November 1903			1,937 1 6
AMOUNT OF GENERAL FUNDS			£104,959 13 9
IX. TWEEDDALE MEDAL FUND—			
Heritable Bond, at 3½ per cent			£500 0 0
X. THE ROBERT MURDOCH PRIZE FUND—			
Legacy by the late Miss Murdoch, Blantyre, to be applied in giving a prize of £10 a-year, while it lasts, to the Breeder of the best Clydesdale Brood Mare at the Annual Show of the Society, £100, less duty.			
Amount per last account, including interest		£56 2 3	
Interest on Deposit Receipt, dated 17th December 1902, and uplifted 13th October 1903		1 4 10	
			£57 7 1
Transferred to Dumfries Show Account		10 0 0	
On Deposit Receipt with Royal Bank, dated 13th October 1903		£47 7 1	

* The original cost of these Bank Stocks was £23,632, 9s. 4d., showing a profit at present prices of £20,903, 9s. 5d.

JAS. H. GIBSON-CRAIG, *Treasurer.*

JOHN GILMOUR, *Member of Finance Committee.*

WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 13th January 1904.

AGRICULTURAL SOCIETY of SCOTLAND for the Year 1902-1903.

DISCHARGE.

1. ESTABLISHMENT EXPENSES—		
Salaries and Wages—Secretary, £900; Clerk, £300; Second Clerk, £190;		
Messenger, £72		£1,462
Few-duty, £28; Taxes, £47, 1s. 1d.; Insurances, £17		92
Repairs and Furnishings, £32, 16s. 6d.; Coals and Gas, £23, 9s. 10d.		86
		£1,640 7 5
2. FEE to Auditor of Accounts for 1901-1902		75 0 0
3. EDUCATION—		
(1) Forestry—		
Vote to Lectureship in Edinburgh University	£50 0 0	
Fees of Examiners	18 18 0	
		£68 18 0
(2) Agriculture—Expenses of National Diploma Examination	122 16 6	
		191 14 6
4. CHEMICAL DEPARTMENT—		
(1) Salary to Dr A. P. Aitken	£50 0 0	
(3) Chemists' Fees and Expenses—Fee for Analyses to Members, £24, 7s. 6d.; Analyses of Soils, £47, 5s.	181 12 6	
		£281 12 6
(3) Expenses of Manuring and Sheep-Grazing Experiments, £162, 19s. 6d.—Less Grant from Board of Agriculture, £75, and proceeds of Sheep sold,	82 11 8	
		264
5. VETERINARY DEPARTMENT—Tuberculosis Research, £50; Medals, £21, 0s. 9d.		71
6. BOTANICAL AND ENTOMOLOGICAL DEPARTMENT—Fee to Botanist for year		25
7. DAIRY DEPARTMENT—		
(1) Examination at Kilmarnock—Fees and Expenses	£42 14 10	
(2) Sundry Outlays and Expenses	38 10 1	
(3) Special Grant voted to Dairy School at Kilmarnock	100 0 0	
		£181 13 11
Less Fees forfeited by unsuccessful Candidates	6 0 0	
		£175 13 11
(4) Milk Record Scheme—Salaries and Expenses £196 6 7		
Less Share of outlays received from Ayrshire, £26, 8s. 5d.; Dumfriesshire, £25, 6s. 9d.; Wigtownshire, £23, 17s. 4d.	75 12 6	
		120 14 1
		296 8 0
8. SOCIETY'S TRANSACTIONS		835 2 8
9. ORDINARY Printing, £79, 17s. 9d.; Advertising, £28, 3s. 8d.; Stationery, Books, &c., £26, 10s. 7d.; Postages, &c., £60; Bank Charges, &c. £3, 6s. 8d.		202 13 0
10. GRANTS to Public Societies—Scottish Meteorological Society, £20; Society for Prevention of Cruelty to Animals, £5		25 0 0
11. MISCELLANEOUS PAYMENTS		123 6 1
12. INVESTMENT made		1,768 16 0
13. PAYMENTS in connection with Stirling Show, 1900		15 0 0
14. PAYMENTS in connection with Inverness Show, 1901		20 11 4
15. PAYMENTS in connection with Aberdeen Show, 1902		110 15 0
16. PAYMENTS in connection with Dumfries Show, 1903—Premiums, £2522, 3s. 1d.; Expenses, £4314		6,836 3 1
17. NEW TURNSTILES		100 0 0
18. PREMIUMS for Local Shows and Competitions		606 19 7
19. ARREARS struck off as irrecoverable		53 12 6
20. ARREARS outstanding at 30th November 1903		113 6 0
21. BALANCE due by Royal Bank of Scotland on Accounts Current at 30th November 1903		1,937 1 6
SUM OF DISCHARGE		£15,312 6 10

JAS. H. GIBSON-CRAIG, *Treasurer.*

JOHN GILMOUR, *Member of Finance Committee.*

WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 13th January 1904.

ABSTRACT of the ACCOUNTS

CHARGE.

1. LOCAL SUBSCRIPTIONS—

Dumfriesshire	Voluntary Assessment	£834	1	10
Stewartry of Kirkcudbright	" "	285	16	3
Wigtownshire	" "	150	0	0
Town of Dumfries—Donation	" "	75	0	0
Dumfries and Galloway Union Agricultural Society	" "	100	0	0
B. A. Oswald of Auchenersuive	" "	15	0	0
Hon. H. C. Maxwell Stuart of Terregles and Tiquair	" "	10	0	0

£1,469 18 1

2. AMOUNT COLLECTED DURING SHOW—

Drawn at Gates	£2,275	11	0
Drawn at Grand Stand	429	7	9
Catalogues and Awards sold	212	0	10
Cloak-Rooms	2	7	3
			<hr/>
			2,919 6 10

3. FORAGE SOLD	14	0	6
4. RENT OF STALLS	1,980	3	6
5. RENT OF REFRESHMENT BOOTHS	250	0	0
6. ADVERTISEMENTS IN CATALOGUE AND PREMIUM LIST	114	18	6
7. SPECIAL PRIZES CONTRIBUTED	264	10	0
8. INCOME FROM TWEEDDALE MEDAL FUND	15	19	10
9. INTEREST FROM ROYAL BANK	11	5	1
10. MISCELLANEOUS	1	5	0

 £7,011 7 4

Note.—From the above balance of £205 4 3

There falls to be deducted—

(1) Premiums undrawn at 30th November 1903, amounting to	£181	0	0
(2) One-eighth of £100, cost of new Turnstiles	12	10	0
			<hr/>
			193 10 0

Making the probable Surplus £11 14 3

of the DUMFRIES SHOW, 1903.

DISCHARGE.

1. SHOWYARD EXPENDITURE—

Fitting up Showyard	£2,536 9 6
Rent of Field	140 0 0
Rosettes	28 19 5
Outlays in connection with Water for Showyard	31 9 10
Cutting Grass in Showyard, and hire of Mower	12 10 0
Railway Carriages, £14, 19s. 11d.; Penning of Poultry, £4, 9s. 10d.; Miscellaneous, £10, 2s. 9d.	29 12 6

£2,779 1 3

2. FORAGE 239 5 6

3. POLICE 26 17 8

4. TRAVELLING EXPENSES of Judges, Stewards, &c. 154 16 11

5. HOTEL AND LUNCHEONS—

Hotel Bill for 41 Directors, 7 Stewards, 29 Judges, &c.	£217 2 3
Luncheons and Breakfasts in Showyard for Directors, Judges, and Committee, &c.	177 4 10

394 7 1

6. MUSIC 90 9 10

7. PRINTING 237 11 9

8. ADVERTISING and Bill-posting 118 13 9

9. HIGHLAND INDUSTRIES 6 0 0

10. VETERINARY INSPECTION 10 10 0

11. CONCERT for Attendants 2 15 0

12. TREASURER 25 0 0

13. ASSISTANTS and Attendants 159 6 3

14. POSTAGES 50 10 0

15. FORESTRY EXHIBITION (Prizes awarded) 5 0 0

16. MISCELLANEOUS 13 15 0

£4,314 0 0

17. PREMIUMS drawn at 30th November 1903 2,522 3 1

£6,836 3 1

BALANCE OF RECEIPTS 205 4 8

£7,041 7 4

JAS. H. GIBSON-CRAIG, *Treasurer.*

JOHN GILMOUR, *Member of Finance Committee.*

WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 13th January 1904.

ABSTRACT of the ACCOUNTS of the

CHARGE.

I. FUNDS as at 30th November 1902—

£3,193, 6s. 8d. 3 per cent Debenture Stock of the North British Railway Company, purchased at	£2,650	0	0
Amount on Loan over the Earl of Minto's Estates at $3\frac{1}{4}$ per cent	3,500	0	0
£550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, purchased at	611	10	6
£190 London and North-Western Railway Company 4 per cent Guaranteed Stock, purchased at	259	1	11
	<hr/>		
	£7,020	12	5
BALANCE in Royal Bank on Account Current	199	13	5
	<hr/>		
	£7,220	5	10

II. INTEREST—

On Investments—

On £3,193, 6s. 8d. North British Railway Company 3 per cent Debenture Stock, £95, 16s., less tax £5, 0s. 4d.	£90	15	8
On £3,500 on Loan over the Earl of Minto's Estates at $3\frac{1}{4}$ per cent, £113, 15s., less tax £5, 19s.	107	16	0
On £550 Lancashire and Yorkshire Railway Company 3 per cent Debenture Stock, £16, 10s., less tax 19s. 3d.	15	10	9
On £190 London and North-Western Railway Company 4 per cent Guaranteed Stock, £7, 12s., less tax 8s. 10d.	7	3	2
	<hr/>		
	221	5	7

III. INCOME-TAX repaid for three years to 31st December 1902 35 9 7

SUM OF CHARGE £7,477 1 0

ARGYLL NAVAL FUND for Year 1902-1903.

DISCHARGE.

I. ALLOWANCES to the five following Recipients—

J. Douglas Campbell (fifth year)	£40 0 0
John S. Gordon Fraser (fifth year)	40 0 0
Evan Campbell Bunbury (second year)	40 0 0
Gordon Campbell (first year)	40 0 0
Donald Patrick C. Campbell (first year) for half-year	20 0 0
	<hr/>
	£180 0 0

II. MISCELLANEOUS PAYMENTS—

Keith & Co. for Advertising	4 8 9
	<hr/>
	£184 8 9

III. FUNDS as at 30th November 1903—

£3,193, 6s. 8d. 3 per cent Debenture Stock of the North British Railway Company, pur- chased at	£2,650 0 0
Amount on Loan over the Earl of Minto's Estates, at 3½ per cent	3,500 0 0
£550 Lancashire and Yorkshire Railway Com- pany 3 per cent Debenture Stock, purchased at	611 10 6
£190 London and North-Western Railway Com- pany 4 per cent Debenture Stock, purchased at	259 1 11
	<hr/>
	£7,020 12 5
Balance in Royal Bank on Account Current	271 19 10
	<hr/>
	7,292 12 3
	<hr/>
SUM OF DISCHARGE	£7,477 1 0
	<hr/>

JAS. H. GIBSON-CRAIG, *Treasurer.*JOHN GILMOUR, *Member of Finance Committee.*WM. HOME, COOK, C.A., *Auditor.*

EDINBURGH, 13th January 1904.

VIEW OF RECEIPTS AND PAYMENTS

For the Year 1902-1903.

RECEIPTS.

1. ANNUAL SUBSCRIPTIONS AND ARREARS received	£1,000	8	0
2. LIFE SUBSCRIPTIONS	846	6	0
	<hr/>		
	£1,846	14	0
3. INTERESTS AND DIVIDENDS—			
Interests	£1,683	0	7
Dividends	1,690	8	9
	<hr/>		
		3,353	9 4
4. TRANSACTIONS		54	10 8
5. RECEIPTS from Dumfries Show		7,041	7 4
6. RECEIPTS from Inverness Show		5	0 0
7. RECEIPTS from Aberdeen Show		10	0 0
8. MISCELLANEOUS—Repayment of Income-tax		506	9 5
	<hr/>		
SUM OF RECEIPTS	£12,817	10	9

PAYMENTS.

1. ESTABLISHMENT EXPENSES—			
Salaries and Wages	£1,462	0	0
Fou - duty, Taxes, Coal, Gas, Insurance, Repairs, and Furnishings	178	7	5
	<hr/>		
	£1,640	7	5
2. FEE TO AUDITOR of Accounts for 1901-1902	75	0	0
3. EDUCATION	191	14	6
4. CHEMICAL DEPARTMENT	264	3	9
5. VETERINARY DEPARTMENT	71	0	9
6. BOTANICAL DEPARTMENT	25	0	0
7. DAIRY DEPARTMENT	296	8	0
8. TRANSACTIONS	835	2	8
9. ORDINARY Printing, Advertising, Stationery, Post- ages, and Bank Charges	202	18	8
10. GRANTS to Public Societies	25	0	0
11. MISCELLANEOUS	123	6	1
12. INVESTMENT made	£1,768	16	0
	<hr/>		
13. PAYMENTS in connection with Stirling Show		15	0 0
14. PAYMENTS in connection with Inverness Show		20	11 4
15. PAYMENTS in connection with Aberdeen Show		110	15 0
16. PAYMENTS in connection with Dumfries Show—			
Premiums	£2,522	8	1
General Expenses	4,814	0	0
	<hr/>		
	6,836	3	1
17. NEW TURNSTILES		100	0 0
18. PREMIUMS for Local Shows and Competitions		606	19 7
SUM OF PAYMENTS	<hr/>		
		11,439	10 10
	<hr/>		
BALANCE OF RECEIPTS	£1,877	19	11

JAS. H. GIBSON-CRAIG, *Treasurer.*

JOHN GILMOUR, *Member of Finance Committee.*

WM. HOME COOK, C.A., *Auditor.*

EDINBURGH, 13th January 1904.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 4TH FEBRUARY 1903.

Present.—Ordinary Directors—Sir Archibald Buchan Hepburn of Smeaton, Bart.; Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. H. Scott Plummer of Sunderland Hall; Mr F. W. Christie, Dairsie Mains; Mr John M'Hutchen Dobbie, Campend; Mr T. Gordon Duff of Drummur; Mr Robert F. Dudgeon of Gargen; Mr John Wilson, Chapelhill, Edinburgh; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr E. Douglas Paton, Broomhill. *Extraordinary Directors*—Mr James Moffat, Gateside; Mr Walter Elliot, Hollybush; Sir Robert Menzies of Menzies, Bart.; Mr John Speir, Newton Farm; Mr Jonathan Middleton, Clay of Allan; Mr W. T. Malcolm, Dunmore Home Farm; Mr R. Shirra Gibb, Boon. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Dr A. P. Aitken. In the absence of Sir Ralph Anstruther, Mr Gordon took the chair.

The minutes of the Directors' meeting of 7th January were approved of, and the minutes of the general meeting of the same date were submitted.

Dumfries Show, 1903.

The SECRETARY submitted the proof of the prize schedule and regulations of the Dumfries Show.

Cheese Classes.—Mr ALEX. CROSS of Knockdon said that, in regard to the classes for cheese, he understood it was the intention of the Shows Committee to have three classes. He saw from the premium-list that there were only two provided, and he would suggest that there be three classes—viz., one for deep cheese, one for flat cheese, and one for small cheese; the prize-money to be distributed over the three classes.

This was agreed to.

Special Prizes.—Intimation was made that the Cheviot Sheep Society offered a challenge cup, valued at £25, for the best pen of Cheviot sheep, the cup to become the property of the exhibitor who wins it three times, not necessarily in succession. The prize was accepted with thanks.

Intimation was also made that Mr Howatson of Glenbuck was to offer a first prize of a gold medal, and a second prize of a silver medal, for the five best Blackface rams, any age, owned and fed by the exhibitor since 1st January 1903.

The CHAIRMAN moved that they accept the prizes, and thank Mr Howatson for his renewed generosity, and this was agreed to.

Caterers.—It was agreed to have five licensed caterers in the yard, and the offers of Mr James Hay, Aberdeen; Mr John Brodie, Dalkeith; Messrs Wilson & M'Phie, Glasgow; Messrs White & Smith, Glasgow; and Mr R. Steel, Maxwelltown, were accepted. It was also agreed to allow the British Women's Temperance Association to have a pavilion as usual.

Veterinary Inspector.—The SECRETARY intimated that there were two applicants for this post during the Show—viz., Mr M'Intosh and Mr M'Nae.

Mr MOFFAT, Gateside, moved that Mr M'Nae be appointed, and this was agreed to.

Milking Classes.—Mr JOHN SPEIR moved the motion standing in his name—"That, at the Show at Dumfries and those following, two open classes be opened for cows in milk, one for those four years old and upwards, and the other for three-year-olds,

the prizes in these classes to be allocated in whole or in part in proportion to the quantity and quality of the milk yielded over such a period as may be arranged, allowance being made for the time elapsed since calving, in accordance with a scale to be adopted by the Directors." He said that from the remarks at last meeting he had altered his motion, so that it met the objection to his former motion that it covered too much ground. They had a private meeting with the stewards of the showyard, and the result was that he now put forward this motion. His principal reason for bringing it forward was that at all the Shows where the milking tests had been carried on the time allowed to make a reasonable examination of those cows entered was too short. At the Ayr Show they had only two days, and at the London Dairy Shows they had not long enough. It was also against the competitions that in the short time the cows had not a chance to become accustomed to their surroundings. It was held by many that they became so excited that the quantity of the yield of milk was very much lessened from what they were accustomed to give at home, and also the quality was not so good. The competitions were only slowly improving in the number of entries, and they were not taken so much advantage of as would be the case if the animals could have longer time to settle down. Now, he thought in regard to this point the Highland Show offered the best test of any. The cows could be stalled on the Saturday. They had the Sunday as a preliminary day to rest and be milked, and the remainder of the week could be used for the tests. They had thus double the number of days that they could get at any other show where such classes were instituted in this country. Other show tests were carried out under the winter feeding, and in their cases expertness in feeding has much to do in winning the prizes. At the Highland Show they would be tested under natural feeding. Again, there would be no necessity of having the cows calving or served at a certain time. It had been suggested at the meeting of the stewards that he should extend the inquiry to cover the best means for increasing the milking capacity of cows. They thought a scheme should be arranged to cover this, and also the keeping of milk records. With their permission, he would move to the extent that a scheme be drawn up by a committee with the view of further increasing the milking capabilities of dairy cows in general.

Mr W. T. MALCOLM, in seconding, said that the motion was that it be remitted to a committee to consider and report what steps the Society should take to encourage the milking properties of cows.

Sir A. BUCHAN HEBURN asked if this was entirely confined to the milk-producing capacity, or did it include the butter-producing quality of the milk?

Mr SPEIR said that the weight of milk was really a very small item in the whole thing. They must take into consideration the butter fat it contained.

Dr GILLESPIE was entirely in sympathy with the object the mover of the motion had in view in trying to encourage the improving of the milking qualities of the cow. He thought the right course had been taken in remitting the matter to a committee. The remit was wide enough to enable the Committee to view the subject from every point of view. And it must be kept in view that all breeds must be encouraged. (Mr Anderson—"And crosses.") He thought that by going carefully and deliberately about the matter, the very best results might be anticipated.

The motion was agreed to, and the Committee appointed consisted of Messrs Speir (convener), Moffat, Morton, Malcolm, Clark, McNaig, Cross, Dr Wilson, and Dr Gillespie, with power to call experts to their aid.

Turnip-Lifters.

Mr JONATHAN MIDDLETON, in the absence of Mr W. S. Ferguson, moved—"That a trial of turnip-lifters be held in the autumn of this year at a place to be afterwards fixed."

Dr GILLESPIE—In the Show district?

Mr MIDDLETON—Not necessarily.

Dr GILLESPIE said that, as far as he knew, all trials of implements had been held in the Show district when they did take place.

It was agreed that a trial of turnip-lifters be held in the Dumfries Show district.

Cattle-Vans.

The SECRETARY submitted replies from Scottish railway companies regarding the use of cattle-vans for conveying Show cattle by passenger trains. As far as he could gather, these vans were not in use in Scotland. The Highland Railway had two in hand, and if they wanted more they borrowed them from the English railways. He believed that the custom of other railways in Scotland was to hire the vans required from the English companies. In Scotland the rate was the same whether horse-boxes or cattle-vans were used. If one stall in a horse-box were used, the charge was 25

per cent more than for a horse, but the question arose as to whether one stall was sufficient for a cattle beast.

The CHAIRMAN said that his experience was that they could get vans if they were going to send cattle over the Border, but they could not get them from one place to another in Scotland. The Scottish companies, by hiring waggons, lost the mileage rate they would otherwise gain.

Mr ANDERSON thought the Board should recommend the Scottish railway companies to provide these vans.

The CHAIRMAN—We have done that three times already.

Mr CROSS—Let them give horse-boxes at the same rate.

Dr GILLESPIE thought they should again meet the railway directors or officials. It would be better to be face to face with them and have the matter dealt with. It was disgraceful that they could not get in Scotland what they could get in England, and they should never rest satisfied till they got these vans.

This was agreed to.

Tuberculosis Experiments.

The SECRETARY reported having received from the convener of the Committee of Agriculture of the Aberdeen University reports of the investigations into the question of the milk of reacting cows, and the relation between bovine and human tuberculosis. The experiments have gone on for two years, and have been very extensive and scientific. Professor Hamilton had sent in a very exhaustive report, and a financial statement had been submitted. The hope was expressed that this Society might see its way to make a further grant towards giving an honorarium to those who carried out the experiments, and the Science Committee recommended that £50 more be given for this purpose.

The recommendation was agreed to.

Clipping Blackface Sheep.

A resolution was submitted from the Lorn Agricultural Society urging that Blackface sheep exhibited at Shows should not be clipped before the month of May.

The CHAIRMAN said that he presumed that they would adhere to the decision so often come to already, and allow the communication to lie on the table.

This was agreed to.

Testing Seeds.

The Science Committee recommended that the regulations regarding the testing of farm seeds be uniform with those of the Royal Agricultural Society, and that their charges, which were slightly higher than the Royal, be reduced to the same as charged by that Society. This was agreed to.

The schedule of unit values of manures and feeding-stuffs was adjusted.

MEETING OF DIRECTORS, 4TH MARCH 1903.

Present.—Ordinary Directors—Sir Robt. D. Moncreiffe of Moncreiffe, Bart.; Mr John Murray, Munnleston; Mr C. H. Scott Plummer of Sunderland Hall; Mr F. W. Christie, Dairsie Mains; Mr David Wilson, D.Sc., of Carbeth; Mr John Wilson, Chapelhill, Edinburgh; Mr John M'Hutchen Dobbie, Campend; Mr Thomas Gordon Duff of Drummur; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr John M'Craig, Challock; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea; Mr J. Ernest Kerr, Harviestoun Castle; Mr E. Douglas Paton, Broomhall. *Extraordinary Directors*—Mr Walter Elliot, Hollybush; Sir Robert Menzies of Menzies, Bart.; Mr John Speir, Newton Farm; Mr Jonathan Middleton, Clay of Allan; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Murieston House. *Auditor*—Mr William Home Cook, C.A. In the absence of Sir Ralph Anstruther, the Rev. Dr Gillespie took the chair.

The CHAIRMAN paid a fitting tribute to the late Mr James Hay, Little Ythsie, who had on several occasions acted as an Extraordinary Director.

Dumfries Show, 1903.

Special Prizes.—Mr Wentworth Hope Johnstone, President of the Shetland Pony Society, offered the following special prizes:—(1) £7 for best Shetland pony in classes

71 and 74; (2) silver medal for best Shetland pony in class 70; (3) silver medal for best Shetland pony in classes 72 or 73.

It was agreed to accept of these prizes with thanks.

Highland Cattle Judge.—A letter was read from the Secretary of the Highland Cattle Society, transmitting an excerpt of minute of meeting of the Club at Oban in regard to the judge appointed for the breed at Dumfries. The excerpt bore that the finding of the meeting was that two judges at least should have been appointed, and that the judges should have been selected from the list of names sent in by the breeders. The Secretary also submitted a letter from Mr James Cameron, Dundee, the judge appointed, saying he would be obliged if the Directors would consider his position purely in connection with the interests of the Show.

The CHAIRMAN pointed out that in 1901 and 1902, at Inverness and Aberdeen, there was only one judge of Highland cattle, and no objection was taken by the breeders, and presumably they were satisfied. The Ayrshires and Galloways were also judged by one, on the ground that when they were far away from what might be considered the habitat of the breed, they wanted to keep down expenses, and made it the rule that one judge sufficed. If they had intimated their desire for two judges, it would have been attended to.

Mr Campbell, Shinness, was appointed to act along with Mr Cameron.

Trial of Turnip-Lifters.

The SECRETARY reported that the Committee recommended that there be a trial of turnip-lifters in the Dumfries district, at a place and date to be afterwards fixed, and that entries be made before 1st October. The matter was remitted to the Stewards of Implements, with Messrs James Biggar, J. M'Caig, W. S. Sproat, and Mr Kirkpatrick, Annisfield.

Improving the Milking Properties of Cows.

The Committee appointed on this subject recommended the adoption of a scheme for testing the milking properties of cows, a sum not exceeding £200 to be placed at their disposal to meet the expense.

The recommendations were approved.

MEETING OF DIRECTORS, 1st APRIL 1903.

Present.—*Vice-President*—Sir Ralph Anstruther of Balcaskie, Bart. *Ordinary Directors*—Mr R. Sinclair Scott, Burnside; Mr John Murray, Munnieston; Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. M. Cameron, Balnakyle; Mr C. H. Scott Plummer of Sunderland Hall; Mr William Taylor, Park Mains; Mr David Wilson, D.Sc., of Carbeth; Mr John M'Hutchen Dobbie, Campend; Mr Thomas Gordon Duff of Drummuir; Mr John Wilson, Chapelhill, Edinburgh; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr William Clark, Netherlea; Mr Alex. M. Gordon of Newton. *Extraordinary Directors*—Mr James Moffat, Gateside; Sir Robert Menzies of Menzies, Bart.; Mr John Speir, Newton Farm; Mr Jonathan Middleton, Clay of Allan; Mr Charles Howatson of Glenbuck; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Murie-ston House. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Dr A. P. Aitken. Sir Ralph Anstruther in the chair.

Dumfries Show.

Various matters connected with this Show were dealt with. The Local Committee has been appointed, and the Southern Club have elected the Directors and Officials members of the club during the period of the Show.

A question arose as to the meaning of a regulation which prohibits the exhibition of animals in breeding classes which have been shown at any fat stock show. It was agreed that the rule should not apply to animals which had been so exhibited when under twelve months old. The Secretary was instructed to have the terms of the rule made clearer.

Show of 1905.

The minutes of a meeting of the Show Committee bore that proposals had been made for holding the Show of 1905 at either Ayr or Paisley, instead of Glasgow. The Committee, however, recommended that the Show be held at Glasgow, provided the usual financial and other arrangements can be made.

A letter was read from Mr John Watson, Secretary of the Glasgow Agricultural Society, offering the Scotstoun showground, and stating that the Glasgow Society would not hold their Show in 1905 in the event of the offer being accepted. The Council of that Society would also do all in their power to make the Show of the National Society a success.

The report of the Committee was agreed to.

Education of Shepherds' Families.

Mr JAMES MOFFAT, Gateside, Sanguhar, moved as follows—"That a representation be made by the Board of the Highland and Agricultural Society to the Secretary for Scotland as to the necessity which exists for better facilities being provided than hitherto for the education of the children of shepherds and others resident in outlying moorland districts."

Mr HOWATSON seconded, and the matter was remitted to a committee.

It was agreed to send the motion to a small committee, with instructions to report.

Joint Show at Dingwall.

An application for a grant to this Show was considered. It was agreed that the grant of £12 to the Inverness Farmers' Society should now go to the joint show, and the Secretary was authorised to give several medals.

Miscellaneous.

The gold medal of the Society was awarded to Dr Shirra Gibb, Boon, for his great assistance in carrying out numerous experiments for the Society.

The Science Committee had met and made some arrangements in connection with the milk-testing scheme.

MEETING OF DIRECTORS, 6TH MAY 1903.

Present.—Ordinary Directors—Sir Robert D. Moncreiffe, Bart.; Rev. John Gillespie, LL.D., Mouswald Manse; Mr F. W. Christie, Dairsie Mains; Mr David Wilson of Carbeth; Mr John M'Hutchen Dobbie, Campend; Mr Thomas Gordon Duff of Drummur; Mr John Macpherson Grant, younger of Ballindalloch; Mr John Wilson, Chapelhill; Mr St Clair Cunningham, Hedderwick Hill; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill. *Extraordinary Directors*—Mr James Moffat, Gateside; Mr Walter Elliot, Hollyhush; Mr John Speir, Newton Farm; Mr Jonathan Middleton, Clay of Allan; Mr W. T. Malcolm, Dunmore Home Farm; Captain Clayhills Henderson of Invergowrie, R.N.; Mr W. S. Ferguson, Pictstonhill; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Murieston House. *Treasurer*—Sir James Gibson-Craig of Riccarton, Bart. *Hon. Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Dr A. P. Aitken. Sir Ralph Anstruther of Balcaskie, Bart., in the chair.

It was resolved to present an Address to the King on the occasion of his visit to Edinburgh.

The CHAIRMAN made appropriate and feeling reference to the deaths of Sir Robert Menzies, Bart., the Right Hon. R. W. Hanbury, President of the Board of Agriculture, and Mr David Buchanan, Garscadden Mains. It was agreed to send a resolution of condolence to the family of Sir Robert Menzies.

Height of Pony Stallions.

A letter was read from Mr C. Y. Kinloch regarding the increase of the standard for pony stallions at the Society's Show from 14 to 14.2, but it was considered too late to alter the prize list for this year.

Show of 1905.

The SECRETARY laid on the table a report of the conference with the Committee of the Glasgow Agricultural Society on 22nd April. The report stated that the Glasgow Committee had met the Society in a very fair spirit.

It was agreed to approve generally of the report, and leave it to the Committee to complete arrangements.

Honorary Members.

Mr JOHN M. MARTIN moved the following resolution—"That a committee be appointed to report upon men suggested for election as honorary members of the Society, in terms of the Royal Charter."

Dr GILLESPIE seconded the motion, which was unanimously agreed to.

Education of Shepherds' Families.

The Committee reported that a meeting had been held the same day, and it had been agreed to ask continuance of the powers remitted to it, with a view to bring up a further report.

Milk Record Scheme.

The Committee reported that arrangements had now been completed for the beginning of the work under this scheme at Ayr, Dumfries, and Wigtown. A communication was read from the Fenwick Farmers' Society, pointing out that they had been engaged in similar work for several years, and asking a grant to enable them to continue it. In the case of the Fenwick Society the testing is done once every two months, and the Committee are of opinion that it should be done once a month, in which case a £10 grant would be given to the Society, and a report on the work to be submitted to this Society and published in the 'Transactions.'

This was agreed to.

Proposed New Charter.

A Committee appointed at last meeting reported that, after consultation with the legal advisers of the Society, it was agreed to apply for a supplementary charter, for the purpose of obtaining additional powers, as explained in the following memorandum: "The main object of the Directors in seeking for a new Royal Charter is to obtain for the Society fuller powers as to the holding of examinations, and granting diplomas and certificates in agriculture and subjects connected therewith. The Royal Charter granted in 1856 gave the Society certain powers for holding examinations and granting diplomas in agriculture, and under these powers the Society held an annual examination for a diploma given in its own name from 1858 till 1899. From the very outset the influence of this examination was highly beneficial, and it undoubtedly did much to foster agricultural education in Scotland. By and by, however, particularly after 1890, circumstances arose which raised doubt, as to whether the Society's examination as then conducted was productive of as much good as it was in its earlier years. The means of providing education in agriculture were extending rapidly throughout England and Scotland, and examinations and certificates in agriculture were becoming confusingly numerous. The Royal Agricultural Society of England conducted an annual examination in agriculture on lines almost identical with those of the Highland and Agricultural Society's examination. This multitude of agricultural examinations and certificates bewildered and often misled the public, and widely throughout England and Scotland it was felt that there was an urgent need for an agricultural diploma of a high standard and a distinctly national character, the value of which would be understood and appreciated in all parts of the United Kingdom. The English and Scotch national agricultural societies had this state of matters forced upon their consideration, and ultimately they came to the conclusion that they could most successfully meet the felt want, most effectually promote the highest and best interests of agricultural education by discontinuing their separate examinations and setting up in their stead one joint examination upon a high standard, for a diploma to be called the National Diploma in Agriculture. This joint examination was instituted in 1900, and it has already taken such a firm hold upon the country, and become so popular, that for the fourth examination, to be held this month, no fewer than eighty-five students have entered. The advantages obtained by the substitution of one joint national examination for a separate examination by each of the two national societies are very great indeed. That this is the case is recognised almost universally. A question, however, has arisen as to whether or not the existing Royal Charters give the Society power to discontinue its own examination and hold a joint examination in its place. While not accepting this narrow reading of the existing Royal Charters, the Directors are

strongly of opinion that it is advisable for the Society to apply for a supplementary Royal Charter, not merely to remove doubts and difficulties that now exist, but also to so extend its powers as to enable the Society, from time to time, to modify and direct its efforts for promoting education in agriculture as change of circumstances may suggest."

It was resolved that the proposal be brought before a Special General Meeting of the members of the Society on the 3rd June.

Sheep Dip Committee.

DR GILLESPIE moved in terms of notice given—"That a representation be made to the President of the Board of Agriculture urging that two or more sheep farmers, of extensive practical experience of sheep farming in Scotland, be added to the Departmental Committee on the Dipping of Sheep."

Mr A. H. ANDERSON seconded, and the motion was unanimously agreed to.

Forestry Examinations.

It was reported that five candidates had entered for the Forestry Examination last month, and three had sat. Of these two passed, one obtaining the First-Class Certificate and the other the Second-Class Certificate. The next examination takes place two years hence.

MEETING OF DIRECTORS, 3RD JUNE 1903.

Present.—*Vice-President*—Sir Ralph Anstruther of Balcaskie, Bart. *Ordinary Directors*—Mr R. Sinclair Scott, Burnside; Sir Robert D. Moncreiffe of Moncreiffe, Bart.; Mr John Murray, Munnichston; Sir Arch. Buchan Hepburn of Smeaton, Bart.; Rev. John Gillespie, LL.D., Mouswald Manse; Mr C. M. Cameron, Balnakeyle; Mr Wm. Taylor, Park Mains; Mr F. W. Christie, Dairsie Mains; Mr David Wilson, D.Sc., of Carbeth; Mr John M'Hutchen Dobbie, Campend; Colonel Dudgeon of Cargen; Mr John Wilson, Chapelhill, Edinburgh; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie; Mr John M'Caig, Challock; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr J. Ernest Kerr, Harviestoun Castle; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill. *Extraordinary Directors*—Major M'Kie of Bargaly; Mr Andrew Montgomery of Netherhall; Mr James Biggar, Grange Farm; Mr James Moffat, Gateside; Mr Walter Elliot, Hollybush; Mr Jonathan Middleton, Clay of Allan; Mr Charles Howatson of Glenhuck; Mr W. T. Malcolm, Dunmore Home Farm; Captain D. G. Clayhills Henderson of Invergourie, R.N.; Mr W. S. Ferguson, Pictstonhill; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Midcalder. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Hon. Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Dr A. P. Aitken. *Auditor*—Mr Wm. Home Cook, C.A. Sir Ralph Anstruther, Bart., in the chair.

Dumfries Show.

Contributions to the local fund amounting to £834, 1s. 10d. from Dumfries, £285, 16s. 3d. from the county of Kirkcudbright, and £15 from Mr R. A. Oswald, Auchencruive, on account of his Dumfries district properties, were reported.

Show of 1905.

It was moved by Mr R. SINCLAIR SCOTT, and seconded by Mr ALEX. CROSS, Knockdon, and unanimously agreed to, that the Show of 1905 be held in Glasgow, provided satisfactory financial and other arrangements can be made.

Perth County Divisions.

SIR ROBERT D. MONCREIFFE, Bart., moved—"That the divisions of the county of Perth be hereafter known as the Perth Show Division and the Stirling Show Division, instead of Eastern and Western Divisions as at present." This was a proposal made by the late Sir Robert Menzies at the last meeting of the Board which he attended.

Mr W. S. FERGUSON seconded, and the motion was agreed to.

Sheep-Dipping Commission.

A letter was read from the Board of Agriculture intimating that, as the result of the representation made by the Society, Mr John Craig, Innergeldie, Comrie, had been added to the Commission.

The Board nominated Mr Duncan M'Diarmid, Camusericht, Rannoch, as their representative to give evidence before the Commission.

Breach of Show Regulations.

A communication from the Ayrshire Agricultural Society, suggesting that common action be taken by Societies with the view of checking breaches of Show Regulations, was remitted to a committee for consideration and report.

Motor Car Traffic.

Mr ANDREW HUTCHESON, in accordance with the notice given, moved — "That the Society view with apprehension the proposed legislation on the subject of motor car traffic, and appoint a committee to watch all such legislation with a view to the protection of agricultural and all other interests concerned."

Mr W. S. FERGUSON seconded the motion, which was unanimously agreed to, and the Committee appointed as follows:—Convener—Mr Andrew Hutcheson; Sir Archibald Buchan Hepburn, Sir Robert Moncreiffe, Sir John Gilmour, Bart., Messrs W. S. Ferguson, Walter Elliot, A. H. Anderson, J. M'Hutchen Dobbie, and the Chairman *ex officio*.

Miscellaneous.

A letter was read from the St Louis International Exhibition Committee, asking the Society to assist in organising a Forestry Exhibition at the St Louis Exhibition of 1904. The letter was remitted to the Forestry Committee.

Mr J. PATTEN MACDOUGALL of Gallanach was appointed a member of the Argyll Naval Fund Committee, in room of the late Sir Robert Menzies.

N.D.A. Examinations.

The Secretary officially reported the result of the recent examinations held at Leeds for the National Diploma in Agriculture. In the first division forty-seven candidates sat, and sixteen passed; in the second division thirty sat, and twelve passed.

MEETING OF DIRECTORS, 4TH NOVEMBER 1903.

Present.—*Vice-President*—Mr John Speir, Newton Farm. *Ordinary Directors*—Mr William Taylor, Park Mains; Mr F. W. Christie, Dairsie Mains; Mr David Wilson, D.Sc., of Carbeth; Mr John M'Hutchen Dobbie, Campend; Mr John Wilson, Chapelhill; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estates Office; Mr John M'Craig, Challock; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea; Mr Andrew Hutcheson, Beechwood; Mr E. Douglas Paton, Broomhill; Mr John Murray, Munnieston; Mr Jonathan Middleton, Clay of Allan; Mr C. H. Scott Plummer of Sunderland Hall. *Extraordinary Directors*—Sir Ralph Anstruther of Balcaskie, Bart.; Mr Alex. Macduff of Bonhard; Mr George Dun, Woodmill; Colonel Charles Munro, Aberfeldy; Mr Charles Howatson of Glenbuck; Mr W. T. Malcolm, Dunmore Home Farm; Captain Clayhills Henderson of Invergowie, R.N.; Mr W. S. Ferguson, Pictstonhill; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Muirieston House; Mr C. M. Cameron, Balnakyle. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. Sir Ralph Anstruther of Balcaskie, Bart., in the chair.

The minutes of meeting of Directors, held in the Showyard, Dumfries, 22nd July, having been printed and circulated, were held as read, and were approved.

Sir JAMES H. GIBSON-CRAIG called attention to the fact that by agreeing to put Mr Hutcheson's motion on the agenda for the general meeting in the Showyard, the Directors had infringed bye-law No. 14. He did not wish to move the resolution of which he had given notice for that day, but would content himself with directing attention to the irregularity.

The minutes of the general meeting of members, held in the Showyard, Dumfries, 22nd July, were submitted.

The Directors resolved to record in the minutes an expression of the deep regret with which they received the intimation of the death of the Duke of Richmond and Gordon, K.G., and of their sense of the valuable services rendered by him to the Society as President from 1881 to 1884.

On the motion of Sir RALPH ANSTRUTHER, seconded by Mr MACDUFF of Bonhard, the Earl of Mansfield was unanimously elected Chairman of the Board for the ensuing year.

On the motion of Mr FERGUSON, a cordial vote of thanks was passed to Sir Ralph Anstruther for his service to the Society as Chairman of the Board of Directors for the past two years.

Sir Ralph acknowledged the vote of thanks.

The Standing Committees for the ensuing year were appointed, the names to be printed as usual in the premium book.

The Right Rev. Dr Gillespie and Mr J. M. Martin were re-elected as representatives of the Society on the Board of Governors of the West of Scotland Agricultural College.

Mr R. Shirra Gibb and Mr James Macdonald, the Secretary, were re-elected as representatives of the Society on the Board of Governors of the Edinburgh and East of Scotland Agricultural College.

Dumfries Show, 1903.

Accounts.—An abstract of the accounts of the Dumfries Show was submitted, showing a probable surplus of about £10.

Transfer of Tickets.—The Secretary stated that the Steward of Gates had reported upon cases of transfer of admission tickets. One of the cases was thought to be of an aggravated character, and it had been suggested that this case should be dealt with publicly at next meeting of the Board, and that in the meantime the accused party be afforded an opportunity of submitting any explanation he may be disposed to place before the Directors.

This was agreed to.

Trial of Turnip-Lifters.—The Secretary explained that the trial of turnip-lifters had to be postponed on account of only two machines having been entered.

Mr W. S. FERGUSON called attention to the inconsistent action of the implement makers in this connection. The reason assigned was that no prizes were to be offered. He was unable to understand the attitude of the implement makers. It was they who requested that trials of implements should take place without prizes. Now, when that was done in the case of so necessary an implement as the turnip-lifter, the excuse was made for non-entry that prize money was not offered. It was necessary that there should be a trial of turnip-lifters, and he would be disposed to move in future that the Society take its own way in the matter.

Mr JONATHAN MIDDLETON, as one of the stewards of implements, desired to associate himself with Mr Ferguson's remarks. He thought the implement makers had treated the Society with scant courtesy on this occasion. The trial was instituted at the request of the makers, and now they were told that, on account of no prizes having been offered, makers could not afford to exhibit their machines.

Perth Show, 1904.

Local Fund.—The Secretary stated that the county of Fife had agreed to impose a voluntary assessment in aid of the Local Fund.

Forage.—The Secretary was instructed to advertise for tenders for the supply of forage. The following Committee was appointed to consider the tenders and report to the Board—viz., Mr Malcolm (Convener), Mr M'Hutchen Dobbie, Mr Hutcheson, Mr Christie, Mr Dun, Mr Ballingall, and Mr Anderson.

Hotel Accommodation.—The Secretary stated that arrangements had been made for hotel accommodation for Directors and Judges in the Station Hotel, Perth.

Price List.—The Secretary stated that the Shows Committee had met on 3rd November, and had revised the premium list. It was proposed that as usual their report be printed and issued for consideration in detail at next meeting of the Board, only certain urgent matters to be dealt with at this meeting.

The Board approved of this course.

Special Prizes.—The following special prizes were accepted, and votes of thanks accorded to the donors:—

1. The Shorthorn Society.—Two champion prizes of £25 each for the best male and best female shorthorn, open to all, entered in or eligible for entry in Coates's Herd-Book.

2. Clydesdale Horse Society—Two Cawdor cups—(1) for the best Clydesdale stallion, and (2) for the best Clydesdale mare or filly.

3. Sir John Gilmour of Montrave, Bart.—£25 in prizes for yearlings by Thoroughbred stallions, as at Dumfries.

4. Captain Clayhills Henderson of Invergowrie, R.N.—£27 in prizes for Hunter brood mares with foal at foot or to foal this season, as at Dumfries.

5. Hunter Improvement Society—Gold medal for best Hunter filly not exceeding three years old, as at Dumfries.

6. Hackney Horse Society—Gold medal, value £10, for best mare or filly in the Hackney or Pony classes, on the same conditions as at Dumfries.

7. The Polo and Riding Pony Society—£10, 10s. in special prizes for Highland ponies, as at Dumfries.

Highland Ponies.—A letter was submitted from the Secretary of the Polo and Riding Pony Society conveying a recommendation from the Society to the effect (1) that a class be provided for two-year-old Highland pony colts, and (2) that the Society should grant medals for Highland ponies at suitable local shows.

The Secretary read the minute of the Shows Committee recommending that this be given effect to. The minute of the Committee was adopted.

Prizes for Ayrshire Cattle.—The following resolution from the Renfrewshire Agricultural Society was read: "The directors, having had under consideration the amount of prize-money offered as prizes for Ayrshire cattle at the Highland and Agricultural Society Show at Dumfries last week, the meeting is of opinion that the prize-money offered for Ayrshire cattle was insufficient to induce competition, as the prizes should be of greater value, considering that Ayrshire represents more than 40 per cent of the whole cattle in Scotland, and that the prize-money offered should be as much as was formerly given. The secretary was instructed to send an excerpt from this minute to the Secretary of the Highland and Agricultural Society, and to express the hope of the directors of this society that the Highland and Agricultural Society will at future shows of that Society offer more valuable prizes for Ayrshire cattle, so as to encourage the breeding of these animals."

A resolution in the following terms was submitted from the Lower Ward of Renfrewshire Agricultural Society: "That the directors, having had under consideration the inadequate prize-money offered for Ayrshire cattle at the Highland and Agricultural Society's recent Shows, deem it expedient to call the attention of the Highland and Agricultural Society to the necessity for considerably increasing the prize-money at future shows in order to induce competition, and the secretary was instructed to communicate this finding to the Highland and Agricultural Society, and to point out that, as Ayrshire cattle represent about 50 per cent of all the cattle in Scotland, it is only fair that greater encouragement should be given to possible exhibitors."

The Shows Committee recommend as follows: "That the Society adhere to the present arrangement, whereby the same amount of prize-money is allocated to each of the recognised breeds of cattle. That it be pointed out that it is not alone by premiums in its own shows that the Society gives encouragement to the breeders of Ayrshire cattle. By grants to local societies, to the Kilmarnock Dairy School, and by other efforts to promote dairy interests, the Society has within the past eight years given considerably over £2000 to the counties in the Glasgow and Dumfries Show districts. Moreover, largely increased prizes for dairy produce are always offered at the Highland Shows at Dumfries and Glasgow. That, with reference to the statements that Ayrshire cattle make up 40 to 50 per cent of the entire cattle stock of Scotland, it should be observed that these estimates cannot be regarded as anything like approaching to accuracy." The Directors unanimously adopted the recommendation of the Committee.

Galloways.—A letter was read from Major Wedderburn Maxwell suggesting that a rule be introduced to the effect that "No animal of the Galloway breed be eligible for competition at the Show of the Highland and Agricultural Society that has scurs, or has been known to have had scurs."

The SECRETARY submitted a letter from Dr Gillespie stating that, as far as was known, there never had been Galloways exhibited having scurs. The Galloway Society had taken up the question, and the investigation showed that, so far as living Galloways were concerned, only three had been found having scurs, and it was now the rule of the Galloway Cattle Society that no animal having scurs would be eligible for entry in the Herd-Book. Seeing that only Galloways entered in the Herd-Book could compete at the Highland Shows, he thought there was sufficient safeguard. It was agreed to take no action in the matter.

Glasgow Show, 1905.

Local Fund.—Intimations were made of voluntary assessments by the county of Lanark (about £700), Ayr (about £500), Renfrew (about £150), and Bute (about £67).

Breach of Showyard Regulations.

Mr JOHN M. MARTIN reported, with reference to the Committee appointed on 3rd June, that a meeting had been held that day, and that it was resolved to hold a joint meeting of representatives of all the breed societies and open shows in Scotland in the offices of the Highland Society on Tuesday, 5th January 1904, at two o'clock, when it was hoped some scheme of united action would be resolved upon for dealing with exhibitors who committed breaches of showyard regulations. Mr Martin explained that it was intended to restrict the movement to the open shows to begin with, until some plan had been generally approved of.

Railway Rates for Conveying Cattle in Horse-Boxes.

A letter was read from the superintendent of the North British Railway intimating that the Scottish railway companies do not see their way to make any reduction in the existing rates for conveying cattle in horse-boxes by passenger trains.

Correspondents for the Board of Agriculture.

In answer to the request of the Board of Agriculture to nominate correspondents for the Board, it was remitted to a committee to adjust a list of suitable names.

Raw Grain as Malt Whisky.

A communication was submitted from the Morayshire Farmers' Club in favour of steps being taken to stop the practice of blending malt whisky with raw grain spirit. The matter was remitted to the Science Committee for consideration and report.

Milk Record Scheme.

The Committee reported meetings on 23rd July and 4th November. The milk record scheme had been carried out in the counties of Ayr, Dumfries, and Wigtown. Mr Speir was now engaged in preparing a report on the results. The total expenditure had been about £250. Of that amount £75 would be paid by the local committees, and the balance by this Society. The Secretary explained that it was originally intended that one-half cost of the acids employed would be defrayed by this Society, and the other half by the local committees. The scheme, however, has proved more expensive than they had anticipated. The figures he had given represented payment by the Highland and Agricultural Society of two-thirds, and one-third by the local committees. The Committee asked power to continue the work next year, and to have £200 placed at their disposal for the purposes. Agreed.

Fertilisers and Feeding-Stuffs Act.

Arrangements were made for giving evidence before the Departmental Committee on the working of the Fertilisers and Feeding-Stuffs Act.

MEETING OF DIRECTORS, 2ND DECEMBER 1903.

Present.—President—The Earl of Mansfield. *Vice-President*—Mr John Speir, Newton Farm. *Ordinary Directors*—Mr Wm. Taylor, Park Mains; Mr David Wilson, D.Sc., of Carleton; Mr John M'Hutchen Dobbie, Campend; Mr Thomas Gordon Duff of Drummuir; Mr St Clair Cunningham, Hedderwick Hill; Mr Alexander Cross of Knockton; Mr A. H. Anderson, Kippendavie Estate Office; Mr Charles J. Cunningham, Wooden; Mr Wm. Duthie, Tarves; Mr John Cran, Kirkton; Mr William Clark, Netherlea; Mr J. Ernest Kerr, Harviestoun Castle; Mr E. Douglas Paton, Broomhill; Mr J. Douglas Fletcher of Rosehaugh; Mr R. Sinclair Scott, Burnside; Sir Robert D. Moncreiffe of Moncreiffe, Bart.; Mr John Murray, Munnieston; Mr John Marr, Cairnlogie; the Right Rev. John Gillespie, LL.D., Mouswald Manse; Mr Jonathan Middleton, Clay of Allan; Mr C. H. Scott Plummer of Sunderland Hall. *Extraordinary Directors*—Sir Ralph Anstruther of Balcaskie, Bart.; Sir Charles E. Adam of Blair Adam, Bart.; Mr Alex. Macduff of Bonhard; Mr W. Stewart Fotheringham, Murthly Castle; Mr Geo. Dun, Woodmill; Colonel

Charles Munro, Aberfeldy; Mr W. T. Malcolm, Dunmore Home Farm; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Midcalder; Mr C. M. Cameron, Balnakyle; Mr Robert Paterson, Hill of Drip; Mr John Ballingall, Dunbog. *Hon. Secretary*—Sir John Gilmour of Montrave, Bart. The Earl of Mansfield in the chair.

The CHAIRMAN, at the outset, thanked the meeting for appointing him to be not only their president but also their chairman. He had been told that he ought to be a very proud man, as the two offices had never before been conjoined. With so many ex-chairmen on the Board, he hoped to be able to carry through the duties to their satisfaction.

Sheep Dipping Committee.

The Rev. Dr GILLESPIE mentioned that it had been reported to him that the Departmental Committee on Sheep Dipping had up till now examined only two witnesses from Scotland, both from the county of Perth, and that the Committee had intimated that they were not to receive further evidence from Scotland, at any rate in the meantime. He thought it most desirable that in view of the great importance of the subjects being investigated by the Committee, further evidence should be received from other parts of Scotland. He moved, "That the Directors of the Highland and Agricultural Society approach the Departmental Committee on Sheep Dipping, and state that in their opinion the Committee should not refuse further evidence from Scotland."

Dr WILSON seconded, and the motion was unanimously agreed to.

Dumfries Show, 1903.

It was resolved that no further action be taken in the meantime in regard to cases of transfer of tickets for admission to the Dumfries Show.

Perth Show, 1904.

The Reports of the Shows Committee were submitted and adopted, excepting with regard to a proposal to have one class for fat shearling wethers.

Height of Ponies.—With reference to a proposal to introduce a new class for Ponies up to 14.2 hands, the following Committee was appointed to consider and report as to the conditions that should be attached to the different classes of Ponies—viz, Sir John Gilmour, Convener; Sir Robt. D. Moncreiffe, Marquis of Tullibardine, Mr C. J. Cunningham, Mr St Clair Cunningham, and Mr Martin.

Shearling Wethers.—A letter was received from Mr F. W. Christie, suggesting that instead of the one class of fat shearling wethers for all breeds and crosses there should be three separate classes, as follows: Three Blackfaced wethers, one shear; three Cheviot wethers, one shear; three shearling wethers, any cross, out of Blackfaced ewes.

Mr M'UTCHEEN DOBBIE moved that Mr Christie's suggestion be given effect to.

Mr SHIRRA GIBB seconded.

Rev. Dr GILLESPIE moved, as an amendment, that no prizes be offered for fat wethers.

Mr MIDDLETON seconded.

On a show of hands being taken, the amendment was carried by 19 votes to 3.

Special Prizes.—The following special prizes were accepted, and votes of thanks awarded to the donors:—

1. By the Polled Cattle Society—Gold medal for the best breeding animal of the Aberdeen-Angus breed.

2. By the Ayrshire Cattle Herd-Book Society—(a) Champion prize of £10 for best male of the Ayrshire breed in the Showyard entered with a number in the Ayrshire Cattle Herd-Book; (b) Champion prize of £10 for best female in the Showyard entered with a number in the Ayrshire Cattle Herd-Book.

3. By the Oxford Down Sheep-Breeders' Association—£10 in prizes of £5, £3, and £2 for pens of cross-bred lambs got by an Oxford Down tup.

4. By the Suffolk Sheep Society—(a) £10 for the following prizes for Suffolk sheep bred in Scotland: Shearling ewes, £3 and £2, pens of three ewe lambs, £3 and £2; (b) £10 for prizes of £5, £3, and £2 for an open class of pens of three Suffolk ewe lambs; and (c) £10 for prizes as at Dumfries for pens of fat lambs got by Suffolk tups—the prizes in the lamb classes to be subject to the condition that "the lambs be uncoloured and untrimmed, except as to the squaring of the tails."

Scurs in Galloway Cattle.—The SECRETARY submitted a letter from Major Wedderburn Maxwell asking the Directors to reconsider their decision regarding his former letter as to scurs in Galloway cattle.

It was unanimously resolved that the question be not re-opened.

Glasgow Show, 1905.

Date.—Consideration of the date for the Show was postponed.

Supply of Water for Showyard.—A letter was read from Mr Bowers, Depute Town Clerk of Glasgow, stating that the Water Committee of the Corporation had agreed to give a supply of water for the Show free of charge.

The Secretary was instructed to convey the thanks of the Directors to the Water Committee.

Show of 1906.

Mr SHIRRA GIBB moved—"That, provided satisfactory financial and other arrangements can be made, the Show for 1906 be held in the Border District."

Mr SCOTT PLUMMER seconded, and the motion was unanimously agreed to.

Selling Separated Milk for Adulteration.

Mr SPEIR moved—"That it be remitted to the Science Committee to consider what steps, if any, should be taken to prevent the sale of separated milk for the purposes of adulteration." In speaking to the motion, Mr. Speir referred to the large quantity of separated milk which was brought into Glasgow and other large towns in Scotland. After every allowance was made for the amount used for baking purposes and churning, a large proportion was unaccounted for. According to the results of the milk-testing scheme carried through by the Society, every three gallons of genuine milk produced could quite easily be increased to four gallons by the use of separated milk, and yet the requirements of the standard be complied with.

Mr CROSS seconded, and the motion was unanimously agreed to.

National Agricultural Examination Board.

A letter was submitted from the Scottish Education Department intimating that my Lords had appointed Mr John Struthers, C.B., Assistant Secretary, to represent the Department on the National Agricultural Examination Board. The Secretary stated that the Board of Agriculture had appointed Dr Somerville, one of its Assistant Secretaries, to act as a member of the above Board.

Sir Ralph Anstruther, Bart., was appointed a delegate to the conference on Forestry, to be held in connection with the Jubilee meeting of the Royal Scottish Arboricultural Society on 16th February.

Technical School at Golspie.

A grant of £100 was made for the equipment of the agricultural department of the Duchess of Sutherland's Technical School at Golspie.

District Shows.

The SECRETARY submitted the report of the Committee on District Shows, from which it appeared that grants were being made for 1904 to the amount of over £620, to local societies throughout the country.

MEETING OF DIRECTORS, 13TH JANUARY 1904.

Present.—*Vice-President*—Mr John Speir, Newton Farm. *Ordinary Directors*—Mr William Taylor, Park Mains; Mr F. W. Christie, Dairsie Mains; Mr David Wilson of Carbeth; Mr John M'Hutchen Dobbie, Campend; Mr Thomas Gordon Duff of Drummair; Mr Robert F. Dudgeon of Cargen; Mr John Wilson, Chapelhill; Mr St Clair Cunningham, Hedderwick Hill; Mr Alex. Cross of Knockdon; Mr A. H. Anderson, Kippendavie Estate Office; Mr John M'Caig, Challoch; Mr Wm. Duthie, Tarves; Mr John Cran, Kirkton; Mr James Stenhouse, Turnhouse; Mr Wm. Clark, Netherlea; Mr J. Ernest Kerr, Harviestoun Castle; Mr E. Douglas Paton, Broomhill; Mr R. Sinclair Scott, Burnside; Mr John Murray, Munnieston; Sir Archibald

Buchan Hepburn of Smeaton, Bart.; Mr John Marr, Cairnbrogie; the Right Rev. John Gillespie, LL.D., Mouswald Manse; Mr Jonathan Middleton, Clay of Allan. *Extraordinary Directors*—Mr Alexander Macduff of Bonhard; Mr Andrew Ralston, Glamis; Mr George Dun, Woodmill; Colonel Charles Munro, Aberfeldy; Mr Charles Howatson of Glenbuck; Mr W. T. Malcolm, Dunmore Home Farm; Mr W. S. Ferguson, Pictstonhill; Mr R. Shirra Gibb, Boon; Mr John M. Martin, Mid-Caldar; Mr C. M. Cameron, Balnakyle; Mr Robert Paterson, Hill of Drip; Mr John Ballingall, Dunbog. *Treasurer*—Sir James H. Gibson-Craig of Riccarton, Bart. *Honorary Secretary*—Sir John Gilmour of Montrave, Bart. *Chemist*—Dr A. P. Aitken. *Auditor*—Mr William Home Cook, C.A. The Earl of Mansfield in the chair.

Deceased Members.

Before beginning the formal business, the Chairman referred in appropriate terms to the deaths which had taken place since last meeting, of the Right Hon. the Earl of Stair, K.T., and Sir Michael Shaw Stewart, Bart., both of whom had at one time been Vice-Presidents of the Society, and took an active interest in all its affairs.

Edinburgh and East of Scotland Agricultural College.

A letter was read from the Secretary of the Edinburgh and East of Scotland Agricultural College making application for a grant towards a fund being raised for the purchase and equipment of premises for the college.

In accordance with the recommendation of the Finance Committee, it was resolved to give a donation of £300.

Perth Show, 1904.

Forage.—On the recommendation of the Forage Committee, the Board accepted of the offer of Messrs W. S. Ferguson & Co., Perth, to supply forage for the Show.

Stewards.—The Stewards of the various departments were appointed as follows: *Cattle*—Rev. Dr Gillespie; *Horses*—Mr Ferguson, Pictstonhill; *Sheep, Swine, &c.*—Mr John Wilson, Edinburgh; *Forage*—Mr W. T. Malcolm, Dunmore Home Farm; *Parade Stands*—Mr St Clair Cunningham, Hedderwick Hill; *Gates*—Mr M'Hutchen Dobbie, Campend; *Implement*—Mr Middleton and Mr Glendinning.

Prizes for Ayrshire Cattle.—The SECRETARY read a letter from the Directors of the Dumbartonshire Agricultural Society urging that the prize-money for Ayrshire cattle be increased, at least when the Show is held in an Ayrshire cattle-breeding district.

The letter was remitted to the Shows Committee for consideration when preparing the premium-list for the Show of 1905.

Agricultural Motors.—The CHAIRMAN moved—"That a special Committee be appointed to consider and report to next meeting of the Board of Directors as to the holding of trials of agricultural motors and other agricultural machines or implements in connection with the Society's Show at Perth in July 1904."

Mr M'HUTCHEN DOBBIE seconded, and the motion was unanimously adopted.

The Committee were appointed as follows: Mr Middleton, Mr Glendinning, Mr M'Hutchen Dobbie, Mr Ferguson, Mr Christie, Mr Speir, Mr Shirra Gibb, Mr Malcolm, Mr Ballingall, and Mr Dun, with power to add to their number other members of the Society whether Directors or not.

Glasgow Show, 1905.

Local Fund.—The SECRETARY read a letter from the Town Clerk of Glasgow intimating that the Corporation of Glasgow had voted a contribution of £250 to the local fund in aid of the Highland Show at Glasgow in 1905.

The Secretary was instructed to convey the cordial thanks of the Board to the Corporation of Glasgow.

Show of 1906.

The SECRETARY read a letter from the Town Clerk of Kelso inviting the Society to hold its Show of 1906 at Kelso.

The Secretary was instructed to intimate to the Town Clerk of Kelso that his letter would receive consideration in due course.

Experiment on Grass Land.

On the recommendation of the Science Committee, it was resolved that an experiment on the manuring of grass land be carried out, provided suitable ground be obtained, a sum of £30 being voted for the purpose.

Kilmarnock Dairy School.

It was agreed to recommend the continuance for the current year of the grant of £100 to the Kilmarnock Dairy School.

Forestry.

It was resolved to recommend the renewal for the current year of the grant of £50 to the Lecturer on Forestry in the University of Edinburgh.

Regulations for the Appointment of Judges.

In the absence of Sir Robert Moncreiffe, Mr ANDERSON moved—"That in future the Judges selected for the Clydesdale Horse classes shall not be detailed to the particular classes till the morning of the Show, when they shall be allotted by ballot."

Sir JOHN GILMOUR seconded, and the motion was unanimously adopted.

Judges for Perth Show, 1904.

The Judges for the various classes of stock were appointed in Committee.

It was resolved to publish the list in the newspapers as soon as the acceptances have been completed, the right being reserved to at any time make such alterations on the list as may be considered necessary or desirable.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 3RD JUNE 1903.

Sir RALPH ANSTRUTHER of Balcaskie, Bart., in the chair.

The following were elected: *Honorary Members*—The Hon. Horace Plunket, Vice-President of the Irish Department of Agriculture; Sir Ernest Clarke, Secretary of the Royal Agricultural Society of England; Professor Cossar Ewart, University of Edinburgh; Mr F. Grant Ogilvie, Assistant Secretary to the Board of Education, London; and Mr R. Warrington, Harpenden, Herts. *Foreign Associates*—Professor Bang, Denmark; M. Nocard, France; Dr W. Sanders, Chief Experiment Station, Canada; Dr F. G. S. Stebler, Zurich.

New Members.

184 Candidates were balloted for and duly admitted as members.

Election of Office-Bearers.

The SECRETARY submitted the following list of Office-Bearers, as recommended by the Directors: *President*—The Right Hon. the Earl of Mansfield. *Vice-Presidents*—Most Noble the Marquis of Tullibardine, M.V.O., D.S.O.; the Right Hon. the Earl of Kinnoull; Colonel H. S. Home-Drummond of Blair-Drummond; John Speir, Newton Farm. *Ordinary Directors*—R. Sinclair Scott, Burnside; John Murray, Munnieston; Sir Robert D. Moncreiffe of Moncreiffe, Bart.; C. H. Scott Plummer of Sunderland Hall; Rev. John Gillespie, LL.D., Mouswald Manse; John Marr, Cairnbrogie; Jonathan Middleton, Clay of Allan; Sir Archibald Buchan Hepburn of Smeaton, Bart. *Extraordinary Directors*—Thomas Love, Lord Provost of Perth; Sir Ralph Anstruther of Balcaskie, Bart.; Sir Charles E. Adam of Blair Adam, Bart.; John A. Dewar, M.P.; Alex. MacLuff of Bonhard; C. A. Murray of Taymount; W. Stewart Fotheringham of Murthly; Andrew Balston, Glamis; George Dun, Woodmill; Col. Charles Munro, Aberfeldy; Charles Howatson of Glenbuck; W. T. Malcolm, Dunmore; W. S. Ferguson, Pictstonhill; R. Shirra Gibb, Boon; John M. Martin, Midcalder; C. M. Cameron, Balnakyle; R. Paterson, Hill of Drip; George R. Glendinning, Hatton Mains; John Ballingall, Dunbog; Captain Clayhills Henderson of Invergowrie, R.N.

Mr LAURENCE JOHNSTON of Sands pointed out that there was no Director on this list from Kinross and West division of Fife. He moved that Mr George Prentice, Burntisland, be elected in place of Mr W. T. Malcolm of Dunmore.

Dr GILLESPIE pointed out that Mr Johnstone had made rather an unfortunate selection. As it was, Mr Malcolm was one of the most useful members on the list. The basis on which the Extraordinary Directors were selected was as follows: Ten were chosen from the Show district, and ten from amongst those who had rendered good service in connection with the work of the Society. Mr Malcolm was in the latter category. No one had done better work than Mr Malcolm, and there was no one who was more indispensable to the successful working of the Show.

Mr Johnstone's motion was not seconded, and the list therefore stood as above.

Dumfries Show, 1903.

Dr GILLESPIE, convener of the Local Committee, reported that arrangements are well advanced for the Show to be held at Dumfries on 21st July and three following days. The County Councils of Dumfries, Kirkcudbright, and Wigtown subscribe

handsomely to the Show funds by voluntary assessments upon proprietors, while the town of Dumfries also contributed liberally. The entries of live stock do not close till the 15th inst., but already a very large collection of implements and machines has been entered.

Perth Show, 1904.

Mr W. S. FERGUSON, convener of the Local Committee, reported that satisfactory progress had been made with the arrangements for the Show of 1904, to be held at Perth on the 20th of July and three following days. As on former occasions, the town of Perth had granted a free site for the Show on the South Inch, with a supply of water, also free of charge, while the County Councils in the district had been good enough to arrange to raise a voluntary assessment in aid of the funds of the Show.

Show of 1905.

Sir JAMES H. GIBSON-CRAIG, convener of the Shows Committee, moved that—"Provided satisfactory financial and other arrangements can be made, the Show of the Society for the year 1905 be held at Glasgow."

Mr WILLIAM TAYLOR seconded the motion, which was unanimously agreed to.

Education.

Dr GILLESPIE reported upon the results of the examination held at Leeds last month for the National Diploma in Agriculture. In Part I. there were forty-seven candidates, of whom sixteen were successful in passing. In Part II. there were thirty candidates, and of these twelve obtained the diploma. Dr Gillespie said that the examination had proved successful in every respect. One great advantage in this examination was that teachers were not allowed to be examiners of their own students, and the standard of work as well as the standard of test was gradually being raised.

Forestry.

Sir JOHN GILMOUR reported that the Society's examination in Forestry took place in the month of April, when five candidates entered, one obtaining the First-Class and one the Second-Class Certificate. The next examination will be held in April 1905.

Science Department.

Dr SHIRRA GIBB, for convener of the Science Committee, reported on the work of the Science Department. He stated that the experiment upon the improvement of poor pasture by means of top-dressings of basic slag, sulphate of potash, and lime, and by the feeding on of oilcake, which, under the auspices of the Board of Agriculture, the Society is carrying on in conjunction with the West of Scotland Agricultural College, has now entered on its third season. At the three stations under the care of the Society—viz., Boon, Naemoor, and Sunderland Hall—the sheep are already grazing the plots. No manures have been applied this year, but, on the plot on which sheep are being fed with cake, the same kind of cake is being fed as formerly—namely, half-and-half decorticated and undecorticated cotton-cake, and at the rate of about 1 lb. per head per day. This amount of cake will convey yearly to the pasture only about one-twentieth of the phosphoric acid and potash already applied to other plots, but it will add to the soil about 10 lb. to 15 lb. of nitrogen per acre in the form of organic matter, and in this respect it differs from the other plots, to which no nitrogenous manures have been applied, but which are expected to obtain an increased amount of nitrogen from the air as the result of their manurial treatment otherwise.

Botanical Report.

Professor M'ALPINE reported as follows: I have the honour to report that, during this season, I have examined over one hundred samples of grass and clover seeds. The purity is, as a rule, all that can be desired, the impurity, for the most part, being 1 or 2 per cent. There are, however, exceptional cases, such as a burnet containing 25 per cent of sainfoin, and a tall fescue containing 17 per cent of cocksfoot. As several inquiries have reached me regarding the new schedule, on which the results of the seed tests are stated, it is advisable here to explain two points: (1) The germinating power of a sample of grass seeds means the germinating power of a prepared sample—that is, the original sample with all the impurities and all the chaff removed. The germination thus obtained is stated in the column of the schedule headed "Germinated per cent." (2) The chaff, along with other impurities, is taken fully into account at the end of the schedule under the heading "Real value of samples."

This heading draws attention to the fact that it is not the germination of the sample, and not the purity which determine value, but the germination and purity multiplied together. The following table shows real value of samples tested:—

Name of Sample.	Maximum Percentage of Real Value.	Minimum Percentage of Real Value.
Red clover and cow-grass .	97	85
White clover .	96	70
Alfalfa .	96	80
Perennial ryegrass .	97	85
Italian ryegrass .	97	76
Timothy .	99	70
Meadow fescue .	100	85
Cocksfoot .	98	70
Tall fescue .	90	63

Motor Car Traffic.

Mr ANDREW HUTCHESON again moved his motion, which had been discussed at the meeting of the Board of Directors.

Mr LAURENCE JOHNSTON of Sands seconded the motion, and it was adopted.

SPECIAL GENERAL MEETING, 3RD JUNE 1903.

Sir RALPH ANSTRUTHER of Balcaskie, Bart., in the chair.

The meeting then resolved itself into a special general meeting of the Society to consider the following resolution regarding the new charter: "Resolved that the proposal to obtain a Supplementary Royal Charter, extending the powers of the Society, be and hereby is approved, and that the Society be and hereby is authorised to make application for such charter in the terms of the draft submitted to the meeting and initialled by the Chairman, subject to such additions, alterations, and amendments as the Directors of the Society may think fit to make thereon either before the application for the same is made, or in the course of the procedure for obtaining the same."

The SECRETARY explained that in the year 1856 a Supplementary Charter was obtained to enable the Society to take an active part in the promotion of agricultural education. One provision of that charter was that a Council of Education should be appointed. Exception had been taken by one member of the Council to the interpretation of that charter, and the object of this proposed new charter was to make clear the power of the Society in connection with the granting of diplomas for education. Advantage was also taken of the application now being made to get somewhat extended powers in respect of the investment of the Society's funds. The Directors did not ask any more than that they should have the freedom as Directors to invest funds in whatever properties were open to trustees under the law of Scotland.

Dr GILLESPIE formally moved the adoption of the Special Resolution. He explained the considerations which led to the decision to apply for a new charter, considerations fully referred to in the report of the Meeting of Directors on 6th May 1903. The Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland had in 1899 joined hands in establishing a joint examination for the National Diploma in Agriculture. That examination, as they were all aware, had proved a great success. The Council of Education of the Highland and Agricultural Society approved of this diploma, but within the last year or two doubts began to be expressed by one member of the Council as to whether the Society should have anything to do with this class of work, and it was thought that it would be best to apply for a new charter, making plain the powers of the Society in that direction, so as to bring its work into line with the requirements of the present day. He need hardly point out that agricultural education was in a very different condition in the year 1903 from what it was in 1856. Then there was only one Chair of Agriculture in the United Kingdom. Now, as they were all aware, there was a great development, and it was useful that a diploma should be instituted that would test the work done. There could be no doubt of the efficient lines on which the examination

for the diploma for the N. D. A. had been hitherto conducted, and he congratulated their friend Mr Biggar, who since its institution had been examiner in practical agriculture, on the great ability with which he had done his work in that department. Such a motion would commend itself to the members of the Society.

Sir JAMES GIBSON-CRAIG seconded the motion, and explained the meaning of the application for power to invest the funds. They did not ask for any other powers than those which were possessed by trustees under the laws of Scotland as at present administered. The motion was unanimously agreed to.

The CHAIRMAN then formally moved that it be referred to the Board of Directors, with powers to take all the necessary steps to carry this resolution into effect.

Mr ANDREW HUTCHESON seconded, and the motion was unanimously agreed to.

GENERAL MEETING IN THE SHOWYARD AT DUMFRIES, 22ND JULY 1903.

The usual general meeting of members of the Society was held in the Showyard pavilion. There was a crowded attendance. Lord HERRIES, President of the Society, occupied the chair, having on his right Lord Onslow, the Minister of Agriculture; and among others present were the Duke of Buccleuch, the Earl of Dalkeith, the Earl of Mansfield, Sir Thomas Elliot, Secretary of the Board of Agriculture; Sir John Gilmour of Montrave, Sir James Gibson-Craig of Riccarton, Sir Mark J. MacTaggart Stewart, M.P.; Mr Maxwell of Munches, M.P.; the Master of Polwarth, Mr Johnston Douglas, Comlongan Castle; Mr Oswald of Auchencruive, Colonel Dudgeon of Cargen, Mr Douglas Fletcher of Rosehaugh, Mr A. M. Gordon of Newton, the Rev. Dr Gillespie of Mouswald, Mr W. B. Jardine, yr. of Castlemilk; Mr Howatson of Glenbuck, and Provost Glover, Dumfries.

The CHAIRMAN, at the outset of the proceedings, expressed his satisfaction at being President of the Society this year, when the Show was such an excellent one, and the attendance, so far as they could judge, was so good. He thought in these days when on the other side of the Border they were told that it was almost impossible to keep up these peripatetic shows, and that the expense of these shows was so great that they found they were not able to pay their way, it was most satisfactory to feel in Scotland, at any rate, no such difficulty was felt, and that the Highland and Agricultural Show was now in as prosperous a state as it ever was before. If they went round the Show they would see that things were very much altered from what they used to be. In the early days he fancied the show of animals was the most interesting thing. Perhaps now the most interesting things were the machinery and new inventions, many of which were of such great service to agriculture.

The Rev. Dr GILLESPIE, on behalf of the Directors, expressed their regret that the water-supply had occasionally failed to provide a sufficient supply for the live stock when it was wanted. Every precaution was taken to ensure that there would be a good supply, but the pressure had proved very much less than was expected.

Sir JOHN GILMOUR moved that the cordial thanks of the Society be given to Provost Glover and the Magistrates and Town Council of Dumfries for their assistance and co-operation in furthering the success of the Show, and for their liberal contribution towards the funds.

Mr DUTHIE, Collynie, seconded, and the motion was cordially adopted.

Provost GLOVER acknowledged the vote of thanks.

Mr JOHN WILSON, Edinburgh, moved that the cordial thanks of the Society be given to the subscribers to the fund in aid of the Show, and to the donors of special prizes for the liberal support that they had given to the Society. He noticed from the list published that the subscriptions on behalf of the Society amounted in all to £1460—which included the county of Dumfries, £884; the Stewartry of Kirkcudbright, £286; the county of Wigtown, £150; the town of Dumfries, £75; and the Dumfries and Galloway Union Agricultural Society, £100. The sum of £520 had been subscribed by private individuals towards the special prizes.

Mr A. H. ANDERSON, Kippenross, seconded, and the motion was carried unanimously.

Mr JONATHAN MIDDLETON, Clay of Allan, Fearn, Ross-shire, moved that hearty thanks be given to the Rev. Dr Gillespie and to the other members of the Local Committee for the assistance rendered by them in carrying out the Show and promoting its success.

The Rev. Dr GILLESPIE acknowledged the vote of thanks on behalf of the Committee, and said they had the success of the Show very deeply at heart.

The CHAIRMAN said that Lord Onslow had come there at very great inconvenience to himself in order to show the great interest he took in agriculture, and also to show that he was ready to receive any advice which many of them were able to give him on the subject of agriculture. They all regretted very much the lamented death of Mr Haulbury, who did so much for agriculture throughout the country. At the same time, they felt that in Lord Onslow they had a successor who would continue to take the same interest in agriculture, and would work for the benefit of those interested in it. He begged, on behalf of the Society, to thank Lord Onslow for coming down there and addressing them.

The EARL OF ONSLOW, who was received with applause, said it was always a very pleasant thing for a mere Englishman to be allowed to come down and see something of Scottish institutions, and of the way in which work is carried on in Scotland. He often stood by the side of his friend, Lord Balfour of Burleigh, with a feeling of chastened humility, when he proceeded to recount how, in every department, they did things better in Scotland. Having referred to the Motor Car Traffic Bill and other matters, his lordship proceeded: You may, perhaps, have seen that I am endeavouring to establish throughout England and Scotland a system of agricultural correspondence—gentlemen who will correspond with the Board of Agriculture upon the subjects which concern those who live in their immediate neighbourhood. I am going by and by to ask this Society, the leading Society in Scotland, to give me a good deal of help in the selection of these gentlemen. I want to say that I desire to get in our system, not men who have particular hobbies to air or theories that they desire to see carried into practice. I want really good practical men who want to help their brother farmers, and who will help us to help them. I shall have an opportunity in October next of coming down to Edinburgh and discussing with the Chamber of Agriculture some of those matters which I know are of interest to all of you, and, therefore, I am not going to trouble you upon any further topics.

The Motor Car Bill.

Mr HUTCHESON moved—"That this meeting, whilst approving of many of the provisions of the Motor Car Bill, are of opinion that clause 1, section 1, would prove unworkable in practice, and that clause 5, section 1, whereby all speed limit is abolished, is a provision which our country is not prepared to accept, and that the Society petition for a speed limit being introduced into the Bill."

Mr WALTER RUTHERFORD, Crailing Tofts, Kelso, seconded.

The CHAIRMAN said he proposed an amendment last week in the House of Lords limiting the speed, but, unfortunately, it was lost.

Sir JOHN GILMORE moved as an amendment that the Society ask the Secretary for Scotland to have inserted in the Motor Car Bill, now before Parliament, a clause giving the local authority power, with the approval of the Secretary for Scotland, to have roads other than main roads closed against motors, except at such speed as might be fixed for the district by the local authority. He thought they should try to strengthen the hands of the County Councils in dealing with purely country or farm roads.

Sir MARK J. M'TAGGART STEWART seconded.

On a division, the resolution was carried by a large majority.

The Selection of Judges.

Mr LAURENCE JOHNSTON of Sands moved the following motion, of which notice had previously been given—"That the present system of selecting Judges for the Highland Society Show is not considered satisfactory by many exhibitors, and that it be remitted to a committee to go into and investigate the whole matter, and report; the points calling for special attention being: (1) The mode of selection. (2) Those who should not be eligible to act as judges, and under this heading special attention is asked to the following: (a) Whether it is considered desirable in future that Directors of the Society should, during their period of office, be nominated by the Board to act as judges at the Society's Show; (b) Whether editors of newspapers, agricultural reporters, or correspondents to any paper in Scotland be appointed judge in any class; (c) Whether in the Clydesdale horse section dealers in Clydesdale horses, or those known to be such, whether holding farms or otherwise, and owners of stallions professionally let for hire in Scotland, be eligible to judge in this section; (d) That the number of judges in each section should be fixed, and not altered, except at a general meeting of the Society." Mr Johnston, speaking to his motion, said he thought the present mode of selecting the judges was not one that was either popular with, or fair to all the exhibitors, and therefore an inquiry would do no harm if it did no good.

He had been told the previous day by Mr Ferguson, Pictstonhill, that during the twenty-four years he had been a Director of the Society the choice of judges for Border Leicester sheep and Aberleen Angus cattle was practically left to himself.

Mr FERGUSON, Pictstonhill—I deny and repudiate the statement. It is not only a misstatement so far as I am personally concerned, but it is an insult to the Directors.

Mr JOHNSTON said he had no doubt also that the Rev. Dr Gillespie acted similarly for those Directors who were connected with Galloway cattle.

The CHAIRMAN—I think it would be better to abstain from personalities.

Mr JOHNSTON, in the course of further remarks, said that he did not consider it the proper thing for Directors to nominate each other, and to act as judges at the Show.

Mr MAXWELL WEDDERBURN of Glenlair seconded.

The SECRETARY read the Regulations now in force for appointing judges.

Mr R. WILSON asked if these Regulations had been adhered to by the Directors.

The SECRETARY—Yes, on every occasion, and in every particular.

The CHAIRMAN appealed to Mr Johnston to withdraw his motion. He thought the motion really amounted to a vote of no confidence in the Directors. He held that any one who was competent to act as a Director should be qualified to be a judge. The Directors were men who had been chosen and selected, and of whom a high opinion was held, and he thought it was rather a strong order to say that they should not be qualified for judges.

The Rev. Dr GILLESPIE, speaking as one who had been a Director for a quarter of a century, said that one of the most useful things he had been helpful in bringing about was the system of election of Directors of the Society by the members themselves in their respective districts. If those members selected the Directors, and could not trust them, then he thought the Directors should get notice to leave at the very first opportunity. The rules with regard to the appointment of judges had been carried out with the greatest propriety and strictness, not only in the letter but in the spirit. If the members of the Society put any fair representation before the Directors, he was sure they would be very ready to consider it, and if possible to carry it out.

Sir JOHN GILMOUR moved the previous question as a means of dismissing what he called a very absurd motion, which, he said, had been still more absurdly spoken to.

The MASTER OF POLWARTH seconded.

On a vote the previous question was carried by a large majority, 18 voting for Mr Johnston's motion.

On the motion of LORD MANSFIELD, a hearty vote of thanks was given to the Chairman.

LORD HERRIES briefly acknowledged, and the proceedings terminated.

ANNIVERSARY GENERAL MEETING, 13TH JANUARY 1904.

The Right Hon. The EARL OF MANSFIELD, President of the Society, in the chair.

New Members.

61 candidates were balloted for and admitted as members.

Finance.

Sir JAMES H. GIBSON-CRAIG, Hon. Treasurer, laid on the table the volume of accounts for the year to 30th November last. The expenditure for the year amounted to £11,439, and the income to £1377 more, including £845 of life subscription. The income also included £506 of income-tax recovered for the past three years, for which they were indebted to the Secretary. The Dumfries Show, with a prize-list increased over 1895 by £650, had paid its way, but little more. The Society's grants for premiums to local shows and district competitions amounted for the past year to about £620, as compared with £347 eight years ago.

Argyll Naval Fund.

Sir JOHN GILMOUR submitted the accounts of the Argyll Naval Fund for 1902-1903, which showed that the income for the year amounted to £256, 15s. 2d., while the

expenditure was £180 in grants to five naval cadets. He also stated that the two vacancies on the list of beneficiaries announced at this time last year had been filled up during 1903 by the appointment of Gordon Campbell, son of Colonel Campbell, London, and grandson of Sir John Campbell of Airds, Argyllshire; and Donald Patrick Colin Campbell, son of the late Donald Campbell of Ballieveolan, Argyllshire.

Dumfries Show, 1903.

Dr GILLESPIE reported upon the Dumfries Show of last year. As a display of live stock and agricultural machinery and implements the Show was one of the best in recent years. Financially it was fairly successful. The income was sufficient to cover the expenditure, and this was considered satisfactory, in view of the fact that the amount of prize-money given by the Society exceeded that awarded at the Dumfries Show of 1895 by about £650. The Society was indebted to the town of Dumfries, and to the counties of Dumfries, Kirkcudbright, and Wigton for a very handsome local fund, and for hearty co-operation in other respects in carrying through the Show.

Perth Show, 1904.

Mr FERGUSON, convener of the Local Committee, reported that arrangements were well advanced for the Show of 1904, to be held at Perth on Tuesday, 19th of July, and three following days. The County Councils of Perth, Forfar, Fife, and Kinross had been good enough to, as usual, arrange to raise a local fund in aid of the Show by means of a voluntary assessment, and they were hopeful that the city of Perth, in addition to giving an excellent showyard and supply of water free of charge, would also raise a contribution to the local fund. A liberal and attractive prize-list had been prepared, with prize-money by the Society exceeding that for the Perth Show of 1896 by about £730; and there was every reason to hope that the great success of recent Highland Shows at Perth would be maintained on that occasion. He wanted to make the Show of 1904 as successful as the Show last held at Perth, the success of which had been phenomenal.

Glasgow Show, 1905.

Mr R. SINCLAIR SCOTT reported that the Glasgow Show of 1905 will be held in the show grounds of the Glasgow Agricultural Society upon dates soon to be fixed. The Corporation of Glasgow have resolved to give a supply of water free of charge, and to contribute £250 to the local fund being raised in aid of the expenses of the Show. He much regretted that the city of Glasgow had not seen its way to give a much larger grant. The County Councils of Lanark, Ayr, Renfrew, and Bute have resolved to contribute to the local fund by voluntary assessment as in former years, and it is hoped that this example will be followed by the County Council of Argyll.

Show of 1906.

Mr JOHN WILSON moved—"That the Show of 1906 be held in the Border district, provided satisfactory financial and other arrangements can be made.

Dr SHIRRA GIBB seconded, and the motion was unanimously agreed to.

New Charter.

The following motion stood on the agenda in the name of Mr ALEX. GUILD, W.S.—"That a copy of the correspondence which has passed between the Society and the Privy Council relative to the Supplementary Charter on Education be laid on the table for the use of members." Before Mr Guild had spoken—

The CHAIRMAN said that he desired to inform Mr Alex. Guild that the correspondence referred to in his motion lay on the table for his information.

Mr GUILD—"Thank you, my lord."

The following motion stood in the name of Mr GAVIN W. RALSTON, Advocate—"That the resolution with reference to examination in agriculture, moved at the general meeting on 7th June 1899 by the Rev. Dr Gillespie, seconded by Sir Ralph Anstruther, and agreed to by the Society, that the resolutions adopted at a meeting of the Council on Education on 1st March 1899, and approved at a meeting of the Board of Directors on 5th April 1899, be adopted, be rescinded—That it be an instruction to the Board of Directors of the Society that no action be taken during the current year by the Society under and in accordance with the charter or draft supplementary charter approved by His Majesty the King in Council on the 8th day of December 1903, so far as it deals with education."

The CHAIRMAN said, before Mr Ralston rose he had to inform him that this motion was not competent for the present meeting. The motion proposed to rescind a Bye-Law, and, according to the charter, such a motion could only be entertained at a

general meeting after it had been before two meetings of Directors. He understood that Mr Ralston had only given seven days' notice of the motion. [The Royal Charter of 1834, page 15, provides that "every alteration of the Bye-Laws shall be notified at two meetings of the Board of Directors previous to the General Meeting at which they are proposed."]]

MR RALSTON said he did not think the Chairman's ruling was quite correct. He had consulted his friends, and was quite sure he was right.

THE CHAIRMAN—I have also consulted my friends, and am quite sure my ruling is in strict accordance with the charter. It is an incompetent motion.

The Fiscal Question.

MR RALSTON had the following motion on the agenda—"That the Directors of the Highland and Agricultural Society of Scotland extend, in name of the Society, to the Right Hon. Joseph Chamberlain, P.C., M.P., an invitation to deliver an address on his proposed British Fiscal Policy, having special reference to its effect on the interests of the agriculturists of the British Empire, at a meeting in Edinburgh of the agriculturists of Scotland, to be convened by the Directors of the Society; and (2) that the Directors at once communicate this resolution to the right honourable gentleman, requesting him to fix a date for the meeting *quam primum*." He desired to read correspondence which he had had with Mr Chamberlain; and, in view of the recent correspondence between Mr Chamberlain and "Dear Devonshire," he presumed that, if in order, he might take up their time.

SIR JOHN GILMOUR objected entirely to the whole discussion, and much more to the tone in which it had been introduced. He deprecated altogether the introduction of political matter at the meetings of the Highland and Agricultural Society. He therefore moved that Mr Ralston be not heard.

MR GEORGE PRENTICE seconded.

DR GILLESPIE moved the previous question, which was seconded by Mr THOMAS ELDER, Stevenson Main, who argued that the question was not political in a party sense.

A vote was taken between Sir John Gilmour's motion and Dr Gillespie's amendment, when the latter was carried by 78 votes to 49.

MR RALSTON pointed out that his proposal was in strict accordance with the educational policy of the Highland and Agricultural Society—in accordance with the charter of 1856. It was a motion to obtain instruction in national book-keeping. His desire was to put upon Mr Chamberlain's Commission a representative of Scottish agriculture. Mr Ralston then read his correspondence with Mr Chamberlain, from which it was learned that Mr Chamberlain could not see his way to accept an invitation to address a meeting on the Fiscal Question under the auspices of the Society. Mr Ralston therefore withdrew his motion.

District Shows.

SIR ARCHIBALD BUCHAN HEPBURN submitted the report on district shows and competitions, showing that in 1903 grants of money and medals have been given in 315 districts. The total expenditure under this head amounted to £642. For the current year the Directors proposed the following grants: (1) Under section one, eighteen districts for grants of £12 each for cattle, horses, and sheep, and seventeen districts in intermediate competition with a grant of three silver medals to each. (2) Under section two, fourteen districts for grants of £15 each for stallions; special grants of £40 for Highland home industries; £20 for Kilmarnock Cheese Show; £5 to Shetland Agricultural Society, and £3 each to the Agricultural Societies of Orkney East Mainland, West Mainland, Sanday, Rousay, and South Ronaldshay—all in Orkney; eleven districts for two silver medals each; the usual medals for ploughing competitions; and twenty districts for two medals each for cottages and gardens—making the total sum offered in 1904 £620.

Science Department.

DR WILSON of Carbeth reported on the work of the Science Department. He stated that during the year 1903 there were analysed for members of the Society 139 samples, as against 187 for the previous year. Of these there were 23 samples of feeding-stuffs and 69 samples of manures, as against 41 and 73 respectively in 1902. There had thus been a very considerable falling off. A similar experience had occurred in the analyses done for Analytical Associations, and the explanation given, as the result of inquiries, was that the adverse circumstances of the past season had caused farmers to curtail their expenditure in all directions, including the analyses of their purchases of manures and feeding-stuffs. Evidence was being taken by a Departmental Committee of the

Board of Agriculture appointed by Lord Onslow to inquire into the working in Great Britain of the Fertilisers and Feeding Stuffs Act, 1898, the various methods in which it had been administered, and the results which had attended its operation, and to report whether any, and if so, what, further measures could with advantage be taken for the better protection of vendors and purchasers of the articles to which the Act applies. The Society was asked to send a representative to give evidence before the Committee, and Dr Shirra Gibb was appointed for that purpose, and communicated to the Committee the views of the Science Committee of the Society on the subject, and also his own views, derived from his experience as convener of the Committee of the County Council of Berwick in charge of that department of its work.

Forestry.

Sir JOHN GILMOUR moved that the grant of £50 to the Lecturer on Forestry in the University of Edinburgh be continued for the current year. He reported that the next examination in forestry would be held in the spring of 1905.

Approved.

Education.

Dr GILLESPIE reported as to the results of last year's examinations for the National Diploma in dairying. At Reading fifteen competed, and eleven obtained the diploma; at Kilmarnock sixteen competed, and ten obtained the diploma. He was glad to be able to say that the Board of Agriculture and the Scotch Education Department had resolved to co-operate with the Royal Agricultural Society of England and the Highland and Agricultural Society in conducting the examinations for the National Diplomas in agriculture and dairying, the Board of Agriculture having appointed Dr Somerville, and the Scotch Education Department Mr John Struthers, C.B., to act as members of the Board of Management. He moved that the annual grant of £100 to the Kilmarnock Dairy School be continued for the current year.

Professor WALLACE asked if it would not be competent on this report to discuss the educational policy of the Society.

The CHAIRMAN seemed disposed to rule that it would not, but was about to give an explanation when

Mr RALSTON rose and asked questions as to the number of students obtaining Diplomas.

The CHAIRMAN—Notice must be given of these questions. They cannot be answered off-hand.

Dr GILLESPIE—May I say a word?

The CHAIRMAN—No, sir. Is the grant to the Kilmarnock Dairy School approved?

Mr JOHN M'CAIG seconded, and the grant was passed unanimously.

Publications.

Dr GILLESPIE stated that the Publications Committee had completed arrangements for the annual volume of 'Transactions,' which will be issued in March.

A vote of thanks to the Chairman concluded the meeting.

APPENDIX (A)

ROYAL CHARTERS

GRANTED TO THE

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

FOUR Royal Charters are now held by the Highland and Agricultural Society of Scotland. The first was granted in 1787 by his Majesty King George III.; the second in 1834 by his Majesty King William IV.; the third in 1856 by her Majesty Queen Victoria; and the fourth in 1904 by his Majesty King Edward VII.

For convenient reference by Members these Charters are printed here in full. The Bye-Laws applicable to the Royal Charter of 1834 are appended.

ROYAL WARRANT FOR CHARTER OF 1787.

GEORGE R.

OUR SOVEREIGN LORD, considering that an humble Preamble.
petition hath been presented to his Majesty, by and on behalf of JOHN DUKE of ARGYLL, President, and CHARLES EARL of ABOYNE, The Honourable HENRY ERSKINE, Dean of the Faculty of Advocates, Sir WILLIAM FORBES of Pit-sligo, Baronet, and ROBERT DUNDAS, Esq., the Younger of Arniston, his Majesty's Solicitor-General for Scotland, Vice-Presidents of the Society, called *The Highland Society of Edinburgh*, setting forth, That, in the year 1784, the Petitioners and other Persons formed themselves into a Society, by the name or title of *The Highland Society at Edinburgh*, their objects being to inquire into the present state of the Highlands and Islands of Scotland, and of the inhabitants, and into the means of the improvement of that part of the country, by the establishment of towns, villages, and harbours, facilitating the communication through the different

Narrative
of Appli-
cation for
Charter,
and
purposes
thereof.

parts of the Highlands, by roads and bridges, extending and promoting the fisheries, encouraging agriculture, and introducing useful manufactures, and by thus uniting the exertions of the proprietors of land and others, to call the attention of the public to the promotion and prosecution of such beneficial purposes: That the Society has raised money by voluntary subscription of the Members, and applied it agreeably to the plan of their institution; particularly, they have bestowed considerable sums for the encouragement of agriculture and manufactures, by giving premiums to the industrious and active: That the Petitioners and the other Members of the Society have thus associated themselves under certain regulations, whereof a copy was annexed to the Petition, and they humbly conceive that the institution would be highly beneficial, not only to the Highlands and Islands of Scotland, but to the nation at large; and they were advised that if they and their successors were formed and erected into a Society, or body corporate, so as to be enabled to hold property, and to manage the funds of the Society in a regular manner, their exertions might be rendered still more extensive and beneficial to the public,—
AND THEREFORE PRAYING his Majesty would be graciously pleased to grant his Royal Charter or Letters-Patent, under the Seal appointed by the Treaty of Union to be kept and used in Scotland in the place of the Great Seal formerly used there, nominating, constituting, and appointing the Petitioners and the other persons who have already been admitted Members of the said Society, and such persons as shall hereafter be admitted Members thereof, agreeably to the rules of the Society, into one body politic and corporate, or legal incorporation, by the name and title, and under the regulations mentioned in the said Petition: AND HIS MAJESTY, being satisfied that the design of the Petitioners, and of the persons associated with them, is laudable, and deserves encouragement, does therefore ordain a Charter or Letters-Patent to be passed and expedite under the Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, constituting, erecting, and incorporating, as his Majesty, by his prerogative-royal, and of his special grace, for himself and his Royal Successors, hereby constitutes, erects, and incorporates the said JOHN DUKE of ARGYLL, CHARLES EARL of ABOYNE, The Honourable HENRY ERSKINE, Sir WILLIAM FORBES, Baronet, and ROBERT DUNDAS, Esq., and the other persons who have already been admitted Members of the said Society, and such persons as shall hereafter be admitted

Constitu-
tion of
Incorporation
for
the pur-
poses
before
specified.

Members thereof, agreeably to the rules of the said Society, into one body politic and corporate, or legal incorporation, by the name and title of THE HIGHLAND SOCIETY OF SCOTLAND AT EDINBURGH, and as such, and by such name, to have perpetual endurance and succession, and to be able and capable in law to purchase, take, hold, and enjoy lands, tenements, and hereditaments, not exceeding £500 Sterling of yearly rent; and also to take, hold, and enjoy goods, chattels, and other personal property, and to receive donations and legacies for the uses and purposes of the Society, and to lend out and employ the money so acquired and received; and by the name and title aforesaid, to sue, plead, defend, and answer, and to be sued, impleaded, defended, and answered in all or any of his Majesty's Courts of Judicature; and to have and use a common Seal, and the same to change from time to time, as to the said Society shall seem expedient; and otherwise and in all other things to act and do and proceed in such manner as the law permits, and as is usual in the case of persons incorporated, and with all the privileges incident to such incorporation: And further approving, as his Majesty hereby approves, of the following Regulations made by the said Society; That is to say, *First*, That the said Society shall consist of two classes of Members—Ordinary, and Honorary or Correspondent. *Second*, The Members of the first class shall pay at admission and afterwards annually One Guinea towards the general fund of the Society, and Half-a-crown towards payment of the officers' salaries and other smaller expenses; but the Members of the second class shall not be subjected to the annual contribution. *Third*, The mode of election shall be by ballot, at either of the General Meetings. All candidates shall lodge their names with the Secretary one month before the General Meeting, which for the purpose of election must consist of at least twenty Members, one-fourth of whom shall be sufficient to reject. The ballot to commence as early after twelve o'clock as twenty Members have met, and to continue a full hour. *Fourth*, The Society shall annually choose out of the Ordinary Members a President, four Vice - Presidents, a Treasurer, and Secretary, these two last offices to be joint or separate in the option of the Society; and shall also annually choose a Committee of twenty-one Ordinary Members resident in Edinburgh, seven of whom shall make a quorum, the President, one of the Vice-Presidents, or, in their absence, the Senior Member of the Committee, to preside, who shall have no vote but in case of equality: And, in like manner, in the absence of the President and Vice-Presidents,

Corporate Name.

Monies and other Properties.

Regulations.

Society to consist of two Classes.

Payments by Ordinary Members.

Mode of Election.

Election of Office-Bearers.

General Meetings.	the Senior Member of the Committee present shall preside at the General Meetings. <i>Fifth</i> , The Society shall hold two General Meetings in each year, one upon the second Tuesday of January, the other upon any of the months of June, July, or August, which the Committee shall fix at their first meeting in June, and make known by advertisement. <i>Sixth</i> , At the first of these meetings the Society shall choose their President, Vice-Presidents, and Committee, the two senior Presidents and five senior Members of the Committee to be annually changed; at or before which meeting also each Member shall pay his annual contribution, otherwise forfeit his place in the Society. <i>Seventh</i> , The ordinary business shall be conducted by the Committee, who shall meet on the first Friday of each month, and occasionally, upon the intimation of their President, as business may require. All Members, though not of the Committee, may attend their meetings, but are to have no vote. <i>Eighth</i> , The Committee shall keep a record of their proceedings, to be laid before the General Meetings for their consideration and direction.
Election of President, and other Officials, by General Meetings.	<i>Ninth</i> , The subscriptions shall be paid to, and the funds shall be lodged in the hands of the Treasurer, subject to the disposal of the Committee, who shall annually, at their meeting immediately preceding the General Meeting of the Society in January, audit the accounts of the Treasurer, who shall produce them at the Meeting of the Society, and also at every meeting of the Committee, for the inspection of the Members. <i>Tenth</i> , Whatever balance of the funds shall then remain unexpended, together with any donations or bequests that may be made to the Society, shall be formed into a capital, and laid out on proper security, with the approbation of the Committee; no part of such capital to be afterwards applied but by authority of a General Meeting, intimation of the intended application being always made at two meetings of the Committee previous to such General Meeting. <i>Eleventh</i> , Any balance beyond Fifty Pounds Sterling that shall remain in the hands of the Treasurer, after auditing his accounts as above mentioned, shall bear interest at the rate of three per cent per annum, and shall be accounted for by him at that rate. <i>Twelfth</i> , Besides the daily and occasional articles of expenditure to be disbursed by the Treasurer, the Committee shall have power, at any one meeting, to order application of a sum, not exceeding Ten Pounds Sterling, for any of the general objects of the Society; for the application of any sum beyond Forty Pounds Sterling, the authority of a General Meeting shall be necessary. The order or warrant or application of money shall express the purpose of such application, and shall be signed by the Preses of the
Ordinary Business.	
Record of Proceedings.	
Payment of Subscriptions.	
Audit of Accounts.	
Application of Capital.	
Disbursements.	

Committee. *Thirteenth*, It shall be in the power of the Committee to call occasional general meetings, previous intimation of such general meetings being made by advertisement in the Edinburgh newspapers, at least a fortnight before the day of meeting. *Fourteenth*, The Secretary shall have the custody of the records and papers of the Society, subject to the inspection of the Committee, or any members thereof. *Fifteenth*, The Society shall have it in their power to enact new and alter old regulations at their General Meetings, provided that such intended new regulations or alterations shall be notified at two meetings of the Committee previous to the General Meeting at which such new regulations or alterations are proposed to be made: And his Majesty appoints the said Regulations to be duly observed, giving and granting nevertheless, as his Majesty gives and grants, to the Members of the said incorporated Society, and their successors, at their General Meetings, assembled from time to time, full power to make such other and so many bye-laws, constitutions, orders and ordinances as they, or the majority of them present at such meetings, shall judge proper and necessary for the better government and direction of the said Incorporation; and the said regulations herein above recited, as well as the bye-laws, constitutions, orders, and ordinances to be made in future, or any of them, to alter or annul, as the Members of the said Incorporation so assembled, or the major part of them present, shall deem proper and requisite: And his Majesty wills and directs that all the bye-laws, constitutions, orders, and ordinances, made as aforesaid, shall, until altered, be duly observed and kept, provided that the same are noways contrary to the law of the realm, and the general purport and meaning of his Majesty's said Charter and Letters-Patent; and provided likewise that such bye-laws, constitutions, orders, and ordinances, and every alteration thereof, be confirmed in and by the next General Meeting of the said Incorporation, held and kept after the same shall be respectively made as aforesaid: And his Majesty, for himself and his Royal Successors, declares, that the said Charter or Letters-Patent shall be valid and effectual in law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged, in the manner most favourable and beneficial for the said Incorporation, notwithstanding any misrecital, defect, or imperfection in the same: And his Majesty wills and commands that the said Charter or Letters-Patent shall pass the Seal appointed by the Treaty of Union to be kept and used in Scotland, in place of the Great Seal formerly used there, without passing any other seal; for doing whereof these presents shall be to the

Occasional
General
Meetings.Records
and
Papers.Power to
make Bye-
Laws.Power of
making
Bye-Laws
regulated.

Director of his Majesty's Chancery in Scotland, and to the Keeper of the said Seal, and their Deputies, a sufficient warrant.

Given at His Majesty's Court at St James's the seventeenth day of May 1787, in the twenty-seventh year of his Majesty's reign.

By His Majesty's Command,

SYDNEY.

Written to the Seal, and registered the 30th day of July 1787.

ALEXANDER WATSON, *Depute.*

Sealed at Edinburgh, the thirty-first day of July One thousand seven hundred and eighty-seven years.

JOHN WAUCHOPE, *Depute.*

ROYAL WARRANT FOR CHARTER

OF 1834

WILLIAM R.

OUR SOVEREIGN LORD, considering that, on an Preamble.
humble Petition presented to His Majesty King GEORGE
III., His Majesty's Royal Father, of gracious memory, by
and on behalf of JOHN DUKE of ARGYLL, then President, and
CHARLES EARL of ABOYNE, The Honourable HENRY ERSKINE,
Dean of the Faculty of Advocates, Sir WILLIAM FORBES of
Pitsligo, Baronet, and ROBERT DUNDAS, Esq, the Younger
of Arniston, His Majesty's Solicitor-General for Scotland,
all now deceased, then Vice-Presidents of the Society, called
The Highland Society at Edinburgh, setting forth, That, in
the year 1784, the Petitioners and other Persons had formed
themselves into a Society by the name or title of *The
Highland Society at Edinburgh*, their objects being to
inquire into the state of the Highlands and Islands of
Scotland, and of the Inhabitants, and into the means of the
improvement of that part of the country, by the establish-
ment of towns, villages, and harbours, facilitating the com-
munication through the different parts of the Highlands by
roads and bridges, extending and promoting the fisheries,
encouraging agriculture, and introducing useful manufactures,
and by thus uniting the exertions of the proprietors of land
and others, to call the attention of the public to the pro-
motion of such beneficial objects, His Majesty's said Royal
Father did, by Charter or Letters-Patent, bearing date the
17th of May, in the year 1787, constitute, erect, and in-
corporate the said Petitioners, and the other persons who
were then Members of the said Society, and such other
persons as should thereafter be admitted Members thereof,
into one body politic and corporate, or legal incorporation,
by the name and title of THE HIGHLAND SOCIETY OF
SCOTLAND AT EDINBURGH, with the powers, and under the

Narrative
of the
original
Constitu-
tion and
first Char-
ter of the
Society.

regulations particularly narrated in the said Charter or Letters-Patent.

Narrative
of Appli-
cation for
New or
Supple-
mentary
Charter,
and
purposes
thereof.

AND OUR SOVEREIGN LORD further considering, That, in an humble Petition presented to His Majesty by WALTER FRANCIS DUKE of BUCCLEUCH and QUEENSBERRY, President; GEORGE DUKE of GORDON; GEORGE GRANVILLE DUKE of SUTHERLAND; GEORGE MARQUIS of TWEEDDALE; and ARCHIBALD JOHN EARL of ROSEBERRY, Vice-Presidents, in name and on behalf of themselves, and of the whole other Members of THE HIGHLAND SOCIETY of SCOTLAND at EDENBURGH, incorporated as aforesaid, it is set forth, That the said Society, since its erection into a body corporate, had continued to promote the laudable and patriotic purposes of its institution, which had been productive of great benefit to the country; that from the general approbation with which its exertions had been viewed by the public, the Society had received a large accession of Members, and that it now consisted of about 1900 Members, including a very large proportion of the noblemen and gentlemen of rank, property, and professional eminence in Scotland; that whilst the Society had continued to devote a great share of its attention to the Highlands of Scotland, it had of late years been enabled, from the general support which it had received, gradually to extend the sphere of its usefulness, by giving considerable sums annually in premiums for the purpose of improving agriculture, encouraging industry, and rewarding useful inventions in the arts therewith connected, all over Scotland; and also representing to His Majesty, that the Society having applied its funds in a way which experience had shewn to be highly advantageous, is fully satisfied that a continuance of its attention to the improvement of agriculture and the different branches of rural industry, and the arts therewith connected, all over Scotland, as well as to such of the original objects of the institution as may still be beneficially advanced by the Society's exertions, would be eminently beneficial to that part of the United Kingdom, as well as to the nation at large: And further setting forth, That this extension of the purposes of the Institution had been approved of and acted upon by the Society for several years, and that certain alterations in the rules and regulations of the Society, and a variation or extension in their designation or title had been specially approved of at and by a General Meeting of the Society, held at Edinburgh on the 12th day of May 1834,—THEREFORE PRAYING that his Majesty would be graciously pleased to grant a New or Supplementary Royal Charter or Letters-Patent, under the

Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, of new nominating, constituting, and appointing the Petitioners and the other Members of the Society, and such other persons as shall be afterwards admitted Members thereof, agreeably to the rules of the Society, into one body politic and corporate, or legal incorporation, by the name and title of "THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND," and under the regulations mentioned in the said Petition: AND HIS MAJESTY being satisfied that the design of the Petitioners is laudable, and that the patriotic purposes of the said Society eminently deserve encouragement, does therefore ordain a Charter or Letters-Patent, to be passed and expedited under the Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, constituting, and of new erecting and incorporating, as His Majesty, by his prerogative-royal, and of his special grace, for himself and his Royal Successors, hereby of new constitutes, erects, and incorporates the said Petitioners, and the whole other persons who now are Members of the said Society, and such persons as shall hereafter be admitted Members thereof, agreeably to the rules of the said Society, into one body politic and corporate, or legal incorporation for ever, by the name and style of THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND, which is in future to be the name of the said Society instead of "The Highland Society of Scotland at Edinburgh," which they at present use, and as such and by such name and title hereby granted, to have perpetual endurance and succession; with power to the said Society, under the aforesaid name and title, to purchase, take, hold, receive, enjoy, possess, and retain for the uses and purposes of the Society, lands, tenements, or hereditaments, or any estate or interest therein, not exceeding the sum of £2000 Sterling of yearly rent or value, after deducting feu-duties, land-tax, minister's stipend and other public burdens;¹ and to sell, exchange, or dispose of the same; as also to hold, take, receive, enjoy, possess, and retain for the uses and purposes of the Society, all such sum and sums of money, annualrents, goods, and other personal property, as have already been paid, given, received, devised, or bequeathed, or shall at any time hereafter be paid, given, received, devised, or bequeathed, for the uses and purposes of the said Society, under the original or the former corporate name, or the name, style, and title hereby granted; and with full power also to the said Society to lend out the money,

Constitution of Incorporation for the purposes before specified.

Corporate Name.

To hold Lands and other Real Property.

Monies and other Personal Property.

To lend out Funds.

¹ See clause 5 in the charter of 1904.

Deeds,
how to be
taken or
granted
by the
Society.

Form of
executing
Deeds.

Property
and Secu-
rities held
under
former
corporate
name.

Actions at
Law, how
to be pro-
secuted.

funds, and effects already acquired and received, or to be acquired and received on such security, heritable or personal, in Scotland, or in the stock of any of the incorporated banks, or in the public funds of the United Kingdom, as may be determined and approved of in manner after mentioned;¹ declaring that all charters, dispositions, heritable securities, and all other deeds affecting property, heritable or personal, to be granted to or by the said Society, shall be taken to and granted by the said Society in the corporate name and title hereby granted,—that is, to “The Highland and Agricultural Society of Scotland,” without specifying the names of the President, or any of the office-bearers, or constituent members of the said Society; And that all charters, dispositions, or other deeds of conveyance, contracts, discharges, renunciations, acquittances, or other deeds whatever, touching the real estate or the capital of the said Society, granted by the said Society, shall be subscribed by any three of the Ordinary Directors, along with the treasurer, or, in his absence, along with the Honorary Secretary for the time being, and shall be executed at one or other of the stated General Meetings of the Society, or at any meeting of Directors specially summoned for that purpose, and that all such deeds or instruments shall be equally valid and effectual as if the same had been signed by the whole Members or Directors of the said Society: And his Majesty, by these presents, for himself, his heirs, and successors, declares and ordains that all such lands or other heritages, and also all such sum or sums of money, stocks, funds, bonds, heritable or personal, mortgages, or other securities for money whatsoever, as shall at the date of this Charter be held, or shall stand secured or vested for the interest or behoof of the said Society under the former corporate name, or in the name of any office-bearer or office-bearers, or other persons, may and shall continue invested for the purposes of the said Society as now of new incorporated, until the same respectively can be conveniently called up and reinvested, or transferred, or assigned, and duly vested in the said Society, by and agreeably to the name, style, and title hereby granted; and that all deeds and other instruments necessary for the conveying, assigning, discharging, and reinvesting the same, shall be subscribed and executed in the manner and according to the form above prescribed: And all actions or proceedings at law at the instance of the Society, may be brought and maintained in the name of the said Honorary Secretary in his official capacity, and that the death, resignation, or removal of such Secretary shall not abate or prejudice any such actions or

¹ See clause 4 in the charter of 1904.

proceedings at law, but the same may be continued, prosecuted, and carried on in the name of any other Honorary Secretary for the time being, in the same manner as if he had been an original party thereto: And with power likewise to have and use a common seal, and to change, alter, break, and make new the same from time to time as to the said Society shall seem expedient; and otherwise, and in all other things, to act, and do, and proceed in such manner as the law permits, and as is usual in the case of persons incorporated, and with all the privileges incident to such incorporations: And further approving, as his Majesty hereby approves, of the following Regulations made by the said Society; That is to say, *First*, The said Society shall consist of two classes, Ordinary, and Honorary or Corresponding Members. The number of the Honorary or Corresponding Members resident in the United Kingdom of Great Britain and Ireland shall not exceed twenty, but with power to the Society to elect as Honorary Associates persons resident abroad, not subjects of His Majesty, who may have been benefactors to the Society, or who are distinguished for their skill in art or Science, provided that the number of such foreign associates shall not exceed twenty. *Second*, The mode of election of Members, Ordinary or Honorary, shall be by ballot, at one or other of the stated general meetings, and in the manner to be prescribed by any regulation or bye-law to be made thereanent, as hereinafter directed. *Third*, The Society shall hold two general meetings in each year, one upon the second Tuesday in January,¹ and another upon any lawful day of the months of June or July, which the Directors of the Society shall fix annually at any of their ordinary meetings in May or June, and made known by advertisement in any two or more of the Edinburgh newspapers, at least eight days before such meeting: And it shall be in the power of the Directors to call occasional general meetings, previous intimation of such general meetings and the purpose thereof, being made by advertisement in any two or more of the said newspapers, at least ten days before such meeting. At the said general meetings of the Society, twenty shall be a quorum; and the President, or, in his absence, one of the Vice-Presidents; or, in the absence of the Vice-Presidents, any Member who has held the office of President or Vice-President; and in the absence of these, the senior Director present, shall preside; and all questions before general meetings shall be decided by a

Particular
Regulations ap-
proved of.
Society to
consist of
Ordinary
and
Honorary
Members.
Foreign
Associates.

Mode of
Election of
Members.

General
Meetings
of the
Society.

Occasional
General
Meetings.

Quorum at
General
Meetings.

Who to
preside at
General
Meetings.

¹ This provision has been altered by the charter of 1856, which authorises the Directors to summon the General Meeting "for any lawful day in January."

Election of majority of votes of the Members present. *Fourth*,¹ The President, Vice-Presidents and Officers, by General Meetings.

Chairman and quorum of Directors.

Chairman at meetings to have casting vote.

Election of a Secretary and other officers officiating on salaries.

Payments by the Ordinary Members to the Funds of the Society.

Society shall annually, at the general meeting in January, choose, out of the Ordinary Members, a President, four Vice-Presidents, a Treasurer, and an Honorary Secretary. And the Society shall also annually, at the said General Meeting in January, choose out of their Ordinary Members, who are usually resident in Edinburgh or in its immediate vicinity, a Board of Thirty Directors, of whom at least Seven shall be newly elected; and also Ten Extraordinary Directors, who may be only occasionally resident in Edinburgh; which several President, Vice-Presidents, Directors, Ordinary and Extraordinary, Treasurer and Honorary Secretary, shall manage and direct the ordinary business of the Society in all matters, in compliance with the constitution, bye-laws, and regulations of the Institution:—Declaring that, in all meetings of the Directors, seven shall be a quorum; that the President, senior Vice-President, or, in their absence, the senior Ordinary Director present, shall be Chairman of the meeting;² and that the Preses or Chairman of all meetings of the Directors, and of all general meetings of the Society or Incorporation as aforesaid, shall have a deliberative vote; and, in case of an equality, also a casting vote. *Fifth*, The Directors shall annually appoint a Secretary for conducting the general business of the Society, and also any other officers or servants they may find necessary to employ; and the Directors shall fix the salaries or allowances to be paid to such Secretary and other officers or servants: But the said appointment of a Secretary and other officers or servants receiving salaries, and the salaries or allowances to be paid to them, shall always be subject to the approbation of the Society at their General Meeting in January; and the Directors shall also have the power to remove the Secretary and other officers or servants appointed by them: And those who at present act as President, Vice-Presidents, Directors, and Officers of the said Society, shall continue, and have the power of officiating as such, until the next General Meeting of the Society, on the second Tuesday of January next ensuing, when the President, Vice-Presidents, and other necessary officers, shall be elected and approved of for the then next ensuing year. *Sixth*, The Ordinary Members of the Society shall pay upon admission, and afterwards annually, towards the general fund of the Society, such sum or sums as the Society may from time to time fix and declare, by any regulation or bye-law, in manner hereinafter directed; with power to the said members to redeem the annual contribution, by a payment in one sum as the

¹ This Regulation has been altered as shown in Bye-Law 5.

² Altered as in Bye-Law 10.

purchase of a Life Subscription, at such rate as the said Society shall from time to time authorise and appoint. The Honorary or Corresponding Members and Foreign Associates shall not be subject to any annual contribution or other payment. Each Ordinary Member of the Society shall pay his annual contribution for the preceding year, at or before the general meeting in January, or otherwise he shall have no vote. Any person elected an Ordinary Member of the Society, who shall not have objected to his election, on the same being intimated to him by the Secretary, shall not be entitled to resign or withdraw his name as a member of the Society, unless he shall have paid up his life subscription, or shall have previously settled and paid, in annual contributions, a sum equal to that fixed by the Society at the time of his election, to be paid by members as the purchase of a life subscription, in lieu and in redemption of the annual payments: And the Directors shall have power to cause actions or proceedings at law to be instituted against members in arrear of their annual payments, for recovery of such arrears; and it shall not form a bar or valid defence against such actions or proceedings, that the member has tendered his resignation: And it shall be in the power of the Society to expel any member, for any cause which shall appear to a general meeting to require that proceeding; and all such persons shall thereupon cease to be members, or to have any right or interest in the Society or its concerns accordingly.

Seventh, The annual payments by the Ordinary Members of the Society, or sums paid in lieu thereof as contributions for life, shall be paid to the Treasurer, or to any collector to be named by him, such collector being bound to find security for his intromissions, to the satisfaction of the Directors; and he shall receive such remuneration as the Directors shall from time to time fix and determine: And all sums received by the Treasurer or Collector, shall be lodged with the Royal Bank of Scotland, or with such other Bank or Banking Company as the Directors shall appoint; and neither the Treasurer nor the Collector shall at any time retain any balance of the funds in his or their hands greater than £50 Sterling.

Eighth, The funds hitherto acquired and now belonging to the Society, shall form a part of its capital stock; and all the monies to be hereafter received as life subscriptions or the price or redemption of the annual contributions of members shall, either in whole, or to such amount as the Society shall at any time direct and appoint, be added to the capital,—the interest, dividends, or annual produce of which only shall be applicable to the general purposes of the Society; and any donations or bequests that may be made to the Society, which shall not be otherwise

Members not to resign without having paid a certain sum.

Power to the Society to expel Members.

Subscriptions to be paid to the Treasurer or Collector.

Monies to be by them deposited in Bank.

Capital Stock.

Regulating addition to, and investment of Capital Stock.

devised, shall also form a part of, and be added to the capital, and may be employed in the purchase of lands, houses, or other heritable subjects, under the qualifications and restrictions above mentioned, or be invested upon proper security, heritable or personal, in Scotland, or in bank stock, or in the public funds, by the authority of the Directors, subject to the approbation of a general meeting; And no part of the capital, either already acquired or to be so formed, shall be afterwards applied, except by authority of a general meeting, and upon intimation of the intended application being made at two meetings of the Board of Directors, previous to such general meeting; but the Directors, with the approbation of the Society, shall at all times have power to uplift the said capital, or any part thereof, for the purpose of reinvesting the same or any other security which may appear to them preferable, or in the purchase of lands or other heritable property, to the annual value before specified; but no part of the capital shall be lent, originally, or upon reinvestment, to any person or persons holding an official situation or appointment under the Society at the time the same is to be lent or reinvested. *Ninth*, The Society, at its general meetings, shall have power to apply the revenues of the Society for the purposes of the Institution, and to put at the disposal of the Directors annually certain sums, to be applied by them in such manner as may appear to them to be most conducive to its interests, but with and under the provisions before made as to the capital stock. *Tenth*, All orders or warrants for application of money, shall express the purpose of such application, and shall be signed by the Preses of the general meeting, or of the Meeting of Directors at which they may be authorised; and shall also be countersigned by the Treasurer, or, in his absence, by the Honorary Secretary. The Treasurer shall annually make out a detailed account of the income and expenditure of the Society, and of the state of the Society's funds; and the Directors shall annually, at their meeting immediately preceding the General Meeting of the Society in January, have the accounts of the Treasurer audited, and a state of the funds of the Society made up; and the Treasurer shall produce the said accounts and state of the funds at the General Meeting of the Society in January, and submit an abstract or abbreviated view thereof, for the consideration of the Society: The accounts shall also be produced at every meeting of the Board of Directors for their inspection, all conformably to the usage of the Society. AND his Majesty wills and appoints, that the said Regulations be duly observed, giving and granting nevertheless, as his Majesty, for himself and his royal successors, of new gives and grants to the Members of the

Authority
to apply
Capital
Stock, and
to uplift
and man-
age it.

Applica-
tion of
Revenue
by General
Meeting.

Orders or
Warrants
for Money.

Accounts
to be annu-
ally made
up by the
Treasurer.

Power to
make Bye-
laws.

said incorporated Society, and their successors, at their general meetings, assembled from time to time, full power to alter or annul any of the bye-laws, rules or regulations at present in observance, and to make such other bye-laws, rules, regulations or orders, as they, or the majority of them present at such meetings, shall judge proper and necessary, for the better government and direction of the said Incorporation; and afterwards to alter or annul the said regulations herein before recited, as well as the bye-laws, rules, regulations, and orders, to be made in future, or any of them, as the Members of the said Incorporation so assembled, or the major part of them present at such general meeting, shall deem proper and requisite: And his Majesty wills and directs, that all the bye-laws, rules, regulations, and orders, made as aforesaid, shall, until altered, be duly observed and kept, provided that the same are noways contrary to the law of the realm, and to the general purport and meaning of his Majesty's said Charter and Letters-Patent; and provided likewise, that such bye-laws, rules, regulations, and orders, or any of them, and every alteration thereof, shall be notified at two meetings of the Board of Directors previous to the general meeting of the said Incorporation at which they are proposed to be made, declared, or altered; and shall also be confirmed in and by the next general meeting of the said Incorporation, held and kept after they shall have been respectively made as aforesaid: And his Majesty does, for himself and his heirs and successors, declare, that the said Charter or Letters-Patent shall be in and by all things valid and effectual in law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged, in the manner most favourable and beneficial for the best advantage of the said Incorporation, notwithstanding any misrecital, defect, uncertainty, or imperfection in the same: And his Majesty doth further will and command, that this Charter do pass the Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal thereof formerly used there, without passing any other seal or register: For doing whereof, these presents shall be to the Director of his Majesty's Chancery in Scotland, and to the Keeper of the said Seal, and their Deputies, a sufficient warrant.

Power of
making
Bye-laws
regulated.

Given at His Majesty's Court of St James's, the 18th day of June 1834, in the fourth year of His Majesty's reign.

By His Majesty's Command,

MELBORNE

ROYAL WARRANT FOR CHARTER

OF 1856

Preamble. OUR SOVEREIGN LADY considering that the Highland Society of Scotland at Edinburgh was incorporated by Charter or Letters-Patent granted by His Majesty GEORGE III., bearing date the 17th day of May, in the year 1787; that the said Society was of new incorporated by the name and style of The Highland and Agricultural Society of Scotland by charter or letters-patent granted by His Majesty WILLIAM IV., bearing date the 18th day of June, and sealed and registered the 7th day of July, in the year 1834; that in an humble petition presented to Her Majesty by the said Highland and Agricultural Society, it is, *inter alia*, set forth that the said Society was incorporated for the purpose at first of promoting the general improvement of the Highlands of Scotland, and thereafter of advancing the art of agriculture throughout the entire extent of her ancient kingdom; that the means hitherto adopted by the said Society for carrying the latter purpose into effect have been the granting of premiums for agricultural improvements, the holding of shows of cattle, implements, and produce, and the general promotion of the science and practice of agriculture; that other means, however, were open for effecting the same object, of which one is to encourage the proper education of agriculturists; that this encouragement may, in the opinion of the Society, best be afforded by directing young agriculturists to a suitable course of study, and by examining and certifying their successful prosecution thereof; that the duty of determining the said curriculum of study, and of examining and certifying the proficiency of the students who have passed through it, may properly be discharged by the said Society through the medium of a Committee, but that to enable them to appoint such a Committee with the requisite powers, her Majesty's

Narrative of the original Constitution and first and second Charters of the Society.

Narrative of application for supplementary Charter, and purposes thereof

authority was necessary, and therefore, praying her Majesty to grant them a supplementary charter conferring the said powers: And Her Majesty being satisfied that the design of the petitioners is laudable, and that its execution will prove highly beneficial to the public; therefore in supplement of, and in addition to the powers conferred by the charters above set forth, ordain a Charter or Letters-Patents to be passed or expedite under the seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, authorising and empowering the members of the said incorporated Society and their successors, at their general meetings assembled, from time to time, in order to encourage the proper education of agriculturists in Scotland, to constitute and appoint a committee, to be called "The Council of the Highland and Agricultural Society of Scotland on Education," and which Council shall consist of the following members—viz., the President of the said Society, the Lord Justice-General of Scotland, the Lord Advocate of Scotland, the Dean of the Faculty of Advocates, the Professors of Agriculture, Anatomy, Botany, Chemistry, Natural History, and Technology in the University of Edinburgh, all for the time being, and seven other members of the said Society to be chosen from time to time by the Directors of the said Society, and approved of at a general meeting thereof, of which Council the President of the said Society shall be President, and the Lord Justice-General, Vice-President, and five of its members shall be a quorum: And Her Majesty hereby empowers and requires the said Council to appoint a Board of Examiners, and to grant to students in agriculture diplomas bearing the corporate seal of the said Society, and certifying their proficiency in the arts and sciences connected with agriculture: And Her Majesty gives and grants power to the members of the said incorporated Society, and their successors, at their general meetings assembled from time to time, on the report of the said Council, to make and enact all such bye-laws, rules, or regulations, in regard to the course of study to be required of such students, the mode and subjects of examination, and generally for carrying into effect the purposes of Her Majesty's said charter or letters-patent, and the powers thereby granted, as they or the major part of them present at such meeting shall deem proper and requisite, and afterwards to alter or annul the same or any of them, and that in the manner specified in the said charter of his Majesty William IV., with regard to the bye-laws, rules, and regulations therein mentioned. And whereas by the said recited charter it is provided and declared that "the Society shall hold two general meetings in each

Constitution of Incorporation for the purposes of encouraging the Education of Agriculturists. Power to appoint a Council on Education.

Members of Council.

Power to appoint a Board of Examiners, and to grant Diplomas to Students in Agriculture.

Power to enact Bye-laws.

General Meetings of the Society.

Power to
hold
January
Meeting
on any
lawful day
of that
month.

year, one upon the second Tuesday in January, and another on any lawful day in the months of June or July," and seeing that the objects of the Society would be promoted were the provisions in regard to the first of these meetings altered, her Majesty gives and grants permission to the Directors of the said Society to summon such general meeting for any lawful day in January, on the notice and advertisement prescribed in said recited charter. And her Majesty does for herself, and her heirs and successors, declare that the said charter or letters-patent shall be in and by all things valid and effectual in law, according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the manner most favourable and beneficial for the best advantage of the said Incorporation, notwithstanding any misrecital, defect, uncertainty, or imperfection in the same. And her Majesty doth further will and command that this Charter do pass the Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, without passing any other seal or register. For doing whereof, these presents shall be to the Director of her Majesty's Chancery in Scotland, and to the Keeper of the said Seal and their Deputies, a sufficient warrant.

Given at Her Majesty's Court at Saint James's, the
18th day of August 1856, in the 20th year of Her
Majesty's reign.

By Her Majesty's Command.

G. GREY.

ROYAL CHARTER OF 1904

EDWARD THE SEVENTH by the Grace of God of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, King, Defender of the Faith, to all to whom these Presents shall come Greeting:—

WHEREAS a humble Petition has been presented to Us by Preamble.
The Highland and Agricultural Society of Scotland, incorporated by Charter or Letters Patent as aftermentioned, setting forth,
inter alia :—

That the said Society was incorporated under the name of Narrative relating to Charters of 1787 and 1834.
The Highland Society of Scotland at Edinburgh by Charter or Letters Patent granted by His Majesty George III., bearing date the 17th day of May in the year 1787, and that the said Society was of new incorporated under its present name and style by Charter or Letters Patent granted by His Majesty William IV., bearing date the 18th day of June, and sealed and registered the 7th day of July in the year 1834;

That the said Society was originally incorporated for the purpose of promoting the general improvement of the Highlands of Scotland, and thereafter of advancing the art of Agriculture throughout the entire extent of Scotland;

That the members of the said Society having in or before the year 1856 come to be of opinion that its efforts for the advancement of the art of Agriculture could be aided, and the proper education of agriculturists promoted by directing young agriculturists to a suitable course of study, and by examining them and certifying their successful prosecution of the course of study, the said Society obtained from Her late Majesty Queen Victoria a Supplementary Charter under the Seal appointed by the Treaty of Union to be kept and used in Scotland in place of the Great Seal formerly used there, dated the 18th day of August 1856, and written to the Seal and registered and sealed the 28th day of January 1857, by which Supplementary Charter Narrative relating to Charter of 1856.

the members of the said Society at their General Meetings assembled were empowered from time to time to constitute and appoint a Committee to be called "The Council of the Highland and Agricultural Society of Scotland on Education";

Council on
Educa-
tion.

That the Supplementary Charter above mentioned provides that the said Council shall consist of the following members, viz.:—the President of the said Society, the Lord Justice-General of Scotland, the Lord Advocate of Scotland, the Dean of the Faculty of Advocates, the Professors of Agriculture, Anatomy, Botany, Chemistry, Natural History, and Technology in the University of Edinburgh, all for the time being, and seven others, members of the said Society, to be chosen from time to time by the Directors of the said Society, and approved of at a General Meeting thereof, of which Council the President of the said Society is President, and the Lord Justice-General Vice-President, and five of its members are a quorum;

That the said Council are empowered and required to appoint a Board of Examiners, and to grant to students in Agriculture diplomas bearing the corporate seal of the said Society, and certifying their proficiency in the arts and sciences connected with Agriculture; and the members of the said Society are empowered at their General Meetings assembled from time to time, on the report of the said Council, to make and enact all such bye-laws, rules, or regulations as such members, or the major part of them, present at such meetings should deem proper and requisite in regard to the course of study to be required of such students, the mode and subjects of examination, and generally for carrying into effect the purposes of and the powers granted by the said Supplementary Charter, and afterwards to alter or annul the said bye-laws, rules, and regulations, or any of them, and that in the manner specified in the said Charter of His Majesty William IV. with regard to the bye-laws, rules, and regulations therein mentioned;

That by the said Supplementary Charter the provisions of the said Charter of His Majesty William IV., in regard to the date for holding the first annual meeting of the said Society, were altered;

That the said Society, and the said Council thereof, had exercised the powers conferred by the said Supplementary Charter, and that the said Society had made and enacted bye-laws, rules, and regulations in regard to the course of study to be required of students in Agriculture desirous of qualifying themselves for obtaining the diplomas of the Society, and the mode and subjects of examination, and that the said Council had from time to time appointed a Board of Examiners, and examinations had periodically been conducted, and diplomas granted to students who had been found qualified, certifying

their proficiency in the arts and sciences connected with Agriculture;

That in view of the greatly increased provisions introduced in recent years for supplying education in Agriculture, the members of the said Society were satisfied that the efforts of the Society in furthering this important object might now be more usefully directed by means other than those set forth in the said Supplementary Charter, and that the Directors and general body of the members of the said Society were desirous of obtaining another Supplementary Charter conferring further powers upon the said Society; Objects of New Charter.

That the proposal to obtain another Supplementary Charter was submitted to and unanimously approved of by a Special General Meeting of the said Society held on the 3rd day of June 1903, and therefore humbly praying that We should be graciously pleased to grant in favour of the Petitioners Our Royal Charter conferring upon them all or any of the powers, privileges, and discretions suggested in the said Petition, or such others as We, in Our Royal Wisdom, might appoint:

Now know ye that We, having taken into consideration the services to Agriculture which the Petitioners have rendered in the past, and being desirous to promote the further usefulness of a Society which has fostered and encouraged the improvement of Agriculture, and the training and education of those engaged in it, have given, granted, and committed, and do by these Presents give, grant, and commit to the said incorporated Society, in supplement of, and in addition to, the powers conferred by the several Charters above mentioned, full power and authority to the effect afterwritten: That is to say: Powers granted by this Charter.

(1) From time to time by resolutions of the members of the said Society at their General Meetings assembled, or of the major part of them present and voting at such General Meetings respectively:—

(a) To alter or modify the membership prescribed by the said Supplementary Charter of “the Council of the Highland and Agricultural Society of Scotland on Education”; Alteration of Council on Education.

(b) To fix and determine and to alter the maximum and minimum number of persons who shall be members of said Council, and the quorum thereof, and empower the Directors of the said Society from time to time to nominate and appoint such persons as they may deem proper, whether members of the said Society or not, or holders of specified offices or not, to be members of the said Council for such period or periods as the Directors in their discretion may deem proper;

Power to
discon-
tinue and
revive
Council
on Educa-
tion.

Power to
act with or
without
Council
on Educa-
tion.

(c) In the discretion of the said Society to suspend or discontinue the said Council for such period or periods or permanently as the said Society may from time to time resolve and in the discretion of the said Society to alter or annul any such suspension or discontinuance;

(2) To exercise, either with or without the report of the said Council, the powers conferred by the said Supplementary Charter of making and enacting bye-laws, rules, and regulations in regard to the course of study to be required of students desirous of qualifying themselves for the diploma of the said Society, the mode and subjects of examination, and all matters incident thereto; and generally to do everything, and to make and enact all bye-laws, rules, and regulations necessary or desirable for carrying into effect the purposes of and the powers granted by the said Supplementary Charter, and this Charter, or either of them, and afterwards to alter or annul the said bye-laws, rules, and regulations, or any of them, and that in the manner specified in the said Charter of His Majesty King William IV., with regard to the bye-laws, rules, and regulations therein mentioned;

(3) The powers conferred by the said Supplementary Charter of appointing a Board of Examiners, of conducting examinations and of granting diplomas, are hereby confirmed, and of new granted to the said Society, and the said Society may exercise all or any of such powers in its corporate capacity, either through the said Council or through the Directors of the said Society, or any committee, or otherwise as may from time to time be resolved upon by the said Society; and without prejudice to the powers above confirmed and conferred, the said Society shall have full power, which may be exercised as aforesaid, to grant diplomas and also certificates, or either of these, in all or any of the arts and sciences connected with Agriculture, including arboriculture, forestry, horticulture, dairying, and all allied or kindred arts and industries, to do all or any of the matters and things and exercise all or any of the powers aforesaid, either alone or jointly with the Royal Agricultural Society of England, or with any other body, whether corporate or not, and particularly, but without prejudice to the said generality, to grant all or any of such diplomas and certificates either in the form of diplomas or certificates as the case may be, by and in name of the said Society alone, or in the form of joint diplomas or certificates, as the case may be, by the said Society and by any other body or bodies whether corporate or not;

Power to
act with
other
Societies.

Invest-
ments.

(4) To invest, lend out, use and apply all or any of the monies and funds of the said Society as the Directors of the said Society in their discretion may from time to time resolve in manner following, viz. :—

(a) In or upon all or any of the classes of investments, stocks and securities presently within the powers of the said Society;

(b) In or upon all or any of the investments from time to time competent to Trustees by the law of Scotland;

And from time to time, at the discretion of the Directors of the said Society, to alter, change, sell or dispose of all or any of the investments, stocks and securities, and the property, whether heritable or moveable, at the time held by the said Society;

(5) To purchase or otherwise acquire, hold, sell and dispose of, lease, feu and otherwise deal with heritable and real property in Scotland as freely as by the Common Law of Scotland is competent to any body corporate in Scotland not disqualified from so doing by the express or implied terms of its constitution; and Power to hold land

(6) From time to time, and at any time, to discontinue the exercise of all or any of the powers conferred by the said Supplementary Charter and by these Presents, and at any time or times to resume the exercise thereof:

And further, We do hereby will, direct, and declare that all the bye-laws, rules, regulations, and orders to be made as aforesaid shall, until altered, be duly observed and kept, provided that the same are noways contrary to the law of the Realm, and that all costs, charges, and expenses of, and incident to the preparation of obtaining and effectuating this Charter or otherwise in relation thereto, shall be paid out of the funds of the said Society; and that this Charter shall be in all respects valid and effectual in law according to the true intent and meaning thereof, and shall be taken, construed, and adjudged in the manner most favourable and beneficial for the best advantage of the said Society, notwithstanding any misrecital, defect, uncertainty, or imperfection in the same:

IN WITNESS WHEREOF, We have ordered the Seal appointed by the Treaty of Union to be kept and made use of in place of the Great Seal of Scotland to be appended hereto.

Given at Our Court at Sandringham the Sixteenth day of January 1904 in the Third year of Our Reign.

BYE-LAWS

APPLICABLE TO THE PROVISIONS OF CHARTER OF 1834.

Annual
Subscription
of
£1, 3s. 6d.
and life
composition.

1. The Ordinary Members of the Society, with the exceptions contained in the Bye-Law No. 2, and of holders of the Society's Agricultural Diploma, and holders of the Society's First-Class Certificate in Forestry, shall pay at admission, and afterwards annually, in advance, the sum of £1, 3s. 6d., with the option and power of redeeming the same by payment of Twelve Guineas, as the purchase of a Life Subscription, and after ten annual payments of £1, 3s. 6d. have been made a Life Subscription may be purchased for the sum of Seven Guineas.

Annual
Subscription
of 10s.,
and life
composition.

2. Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries, or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, shall pay at admission, and afterwards annually, in advance, the sum of Ten Shillings, with the option and power of redeeming the same by payment of Five Guineas, as the purchase of a Life Subscription, and after ten annual payments of 10s have been made a Life Subscription may be purchased for the sum of Three Guineas.

Election of
Members.

3. The mode of Election of Members of the Society shall be by ballot, at either of the stated General Meetings in January and June or July—at which at least twenty Members must be present. The names of all Candidates for admission as Members shall be lodged with the Secretary, and laid before the Directors, previous to the General Meeting at which they are to be proposed; and such persons whose names shall have been so lodged, as shall be approved of by four parts in five of the Members balloting, shall be declared to be duly elected. Honorary or Corresponding Members or Associates shall not be declared duly elected unless three-fourths of the Members present at the General Meeting at which they are proposed shall have voted for them. Holders of the Society's Agricultural Diploma and holders of the Society's First-Class Certificate in Forestry shall be declared duly elected if one-half of the Members present at the General Meeting at which they are proposed shall have voted for them.

General
Ballot.

4. The Society, when a ballot for Ordinary Members is to commence, and after the names and designations of the Candidates

have been read over, shall have the power, by the unanimous consent of the Members present, to dispense with the form of individual ballot, provided it shall appear to the satisfaction of the meeting that the names of the whole Candidates on the list have been read and approved of in and by the Meeting of the Directors immediately preceding such General Meeting; and, in this case, the election shall be deemed and held to have been made by ballot, according to the intent and meaning of the Charter.

5. The Society shall annually, at the General Meeting in June, choose, out of the Ordinary Members, a President, four Vice-Presidents, a Treasurer, and an Honorary Secretary, and the Society shall also annually, at the General Meeting in June, choose, out of the Ordinary Members, a Board of thirty-two Directors, one-half of whom shall, at the date of their being so elected, be Tenant-Farmers or others who, if they were then to be elected Members of the Society, would fall within the description of those who would have to pay the lower subscription under the terms of the second bye-law. At the same Meeting the Society shall also choose twenty Extraordinary Directors, ten of whom shall be resident in the district in which the Show of the ensuing year is to be held; the other ten shall be selected because of their known interest in and experience of the business of the Society, and of these five shall, when so selected, be either Tenant-Farmers or others who, if they were to be elected Members of the Society, at the date when selected, would come within the description of those persons who are entitled to become Ordinary Members of the Society under the second bye-law. The said President, Vice-Presidents, Directors, and Officers shall come into office on the 1st of November following, and shall continue and have the power of officiating as such until the 1st of November of the succeeding year.

Election of Directors.

6. The eight senior Ordinary Directors shall retire annually, but shall be eligible for re-election. The eight Ordinary Directors to be elected in room of those so retiring, shall be placed at the bottom of the list of Directors for the year, and in the order of rotation as far as practicable in which the Shows run, and so that the name to be placed first on the list of new Directors shall be the Director elected for the district in which in ordinary course the Show would be held during the fourth year of his seat at the Board.

Retirement of Ordinary Directors.

7. The members of the Society resident in each of the eight Show Districts shall, every year, before the 10th April, send to the Secretary the name of a Member to act as an Ordinary Director, and their recommendation shall have due weight given to it by the Board of Directors in the preparation of the list which it submits to the Society for election at the General Meeting. Regulations for this purpose shall be framed by the Board.

Nomination of Directors by Show Districts.

8. A list of Office-Bearers and Directors shall be annually submitted by the Board of Directors, for election by the Society at the General Meeting in June. The Board at its April Meeting each year shall appoint a Committee of its Members to prepare such list, and to submit it for consideration at its May Meeting, that the same may be finally adjusted. The list shall be published in two Edinburgh and two Glasgow Newspapers, at least fourteen days preceding the General Meeting.

List of Office-Bearers to be submitted to General Meeting. List to be published.

9. In the event of a vacancy occurring by the death or retirement of a Director, the Board shall recommend a Member to the next General Meeting in January or June for election in his stead, and the Director thus elected shall take the place in the list of the retiring Director whose vacancy he fills, and shall retire at the time

Filling up Vacancies in Board.

that his predecessor would have done. Any Director, who shall not have attended a Meeting of the Board for one year, unless prevented by bad health, shall be held to have vacated office.

Meetings of
Directors
and their
duties.

10. The Board of Directors shall meet on the first Wednesday of each month from November till June inclusive, and occasionally as business may require, on a requisition by three Directors to the Secretary or on intimation by him. The Board shall keep a record of its proceedings, to be laid before the General Meetings of the Society for its consideration. The President, the Vice-Presidents, the Directors (Ordinary and Extraordinary), the Treasurer, and the Honorary Secretary, shall be entitled to vote at meetings of the Board. Committees shall be appointed by the Board of Directors, and they shall in all cases report procedure to the Board for its consideration. The Board shall have power to appoint one of its number to act as Chairman of the Board and of the Deputation of Directors at the Annual Show, the said Chairman to retire at the end of the year, but if a Member of the Board, to be eligible for re-election.

Appoint-
ment of
Com-
mittees.
Chairman
of Board.

Notices of
motion.

11. Notices of motions by Members of the Board shall be lodged in writing with the Secretary at least eight days before the Meeting at which they wish their motions brought forward.

Motions
at Board
Meetings.

12. Notice of motion may also be given immediately after the reading of the Minutes, but it shall only be taken up provided three-fourths of the Members present are in favour of it being brought forward. The proposer may make a brief statement, but the question of admission of such motion to be put without debate.

Secretary
empowered
to add to
Pro-
gramme.

13. The Secretary shall have power to bring up any matter not included in the printed Programme, such matter being inserted in manuscript in the copies of the Programme to be laid on the table.

Motions
at General
Meetings.

14. At General Meetings of the Society no motion or proposal (except of mere form of courtesy) shall be submitted or entertained for immediate decision, unless notice thereof has been given a week previously to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting.

Duties of
Secretary.

15. The Secretary shall write the minutes and proceedings, carry on the ordinary correspondence of the Society, and superintend the keeping of the records, papers, and correspondence. All records, papers, correspondence, and accounts shall be subject to the inspection of the Board of Directors, or any Member thereof.

Secretary
to act as
Collector.

16. The Treasurer, if he does not himself collect, shall nominate the Secretary as Collector, and the Annual Subscriptions and Life Compositions of Members shall be paid to him in that capacity.

Secretary
empowered
to sub-
scribe
Deeds.

17. In the absence of the Treasurer and Honorary Secretary, the Acting Secretary for the time being shall be empowered to subscribe, in the manner set forth in the Charter, all dispositions or other deeds granted by the Society.

Warrants
for money.

18. Orders or Warrants for the application of money must be signed by the Preses of the General Meeting, or of the Meeting of Directors at which they may be authorised, and must be signed by the Secretary before being issued.

Auditor of
Accounts.

19. The Society shall, at the General Meeting in January, elect a professional Accountant as Auditor of the Society's Accounts, who shall accordingly audit the Treasurer's and Collector's Accounts annually, and for that purpose all necessary data shall

be furnished to him by the Secretary not later than 30th November.

20. The financial year shall be reckoned from the first lawful day of December to the last lawful day of November. A Detailed Annual Account of the Income and Expenditure of the Society, and of the State of the Society's Funds for that period, shall be submitted to the Directors in January, and the abstract thereof required by the Charter shall be published in two Edinburgh Newspapers a week before the General Meeting; the detailed Accounts and State of Funds shall be laid by the Treasurer before the General Meeting in January, such Accounts and Abstract being under the signature of the Auditor and of two Members of the Committee of Finance.

Annual Accounts.

Abstract to be published.

21. In the examination of the Accounts of the Secretary and Collector, which shall be kept in a form to be approved by the Directors, and shall exhibit the whole of the monetary intromissions of the Society, it shall be the duty of the Auditor to direct his attention to all points essential to a *bona fide* audit, including the ascertainment of the following particulars :—

Auditor's Duties.

1st, The due realisation and bringing to Account of the various items of which the Society's Income is composed.

2nd, The Accuracy of the Entries and Summations of the details of Charge and Discharge.

3rd, The Correspondence of the details of Discharge, with the Vouchers for substantiating them.

4th, The sufficiency of the authority for Disbursements, both in reference to the Warrants of the Directors or of General Meetings.

5th, That the requirements of the Charter with respect to Capital have been observed.

APPENDIX.

REGULATIONS FOR NOMINATION OF DIRECTORS BY SHOW DISTRICTS.

1. Meetings shall be held each year in February or March or such other time as may be arranged at each of the eight places where the Shows of the Society are usually held, of the Members resident within each respective Show District, for the purpose of nominating Members to represent these districts on the Board of Management.

Meetings.

2. The dates of these Meetings shall be fixed by the Secretary after consultation with the Directors of each district, and such occasion shall thereafter be adhered to as far as possible, and these dates shall each year be notified in the Premium Book, and intimated by post-card to the Members in each district, and shall be attended by the Secretary or some one authorised by him to represent him.

Dates of Meetings.

3. At any of the Meetings a nomination shall only be valid provided it is supported by at least five Members of the Society, who may either be present at the Meeting, or, if absent, may signify their support by mandates duly signed by them to that effect, and delivered to the Secretary or his representative at the Meeting; and no nomination shall be transmitted to the Directors unless at least fifteen Members be present either personally or by mandate.

Nominations at Meetings.

4. In the event of more persons than one being duly nominated

Method of Voting.

at any of said Meetings, the Secretary shall, not later than the first day of April, send by post to every Member resident within such district a "Voting Paper," with the names of the persons nominated printed thereon, according to a prescribed form, requesting that the same may be filled up and returned to him within seven days. From the returns so received before the 10th day of April, the Secretary shall calculate the number of votes recorded for each nominee, and the one who is found to have the largest number shall be the Member nominated and recommended to the Board to act as an Ordinary Director, in accordance with the 7th Bye-Law; provided not less than one-sixth of the Members resident within the Show District shall have recorded their opinion, failing which there shall be no nomination for that district. The Voting Papers to be considered strictly private, and not to be shown unless a Scrutiny is ordered by the Board.

Class of
Members
eligible.

5 To provide for the requirements of the 5th Bye-Law, that of the thirty-two Ordinary Directors "one-half of whom shall, at the date of their being so elected, be Tenant-Farmers or others who, if they were then to be elected Members of the Society, would fall within the description of those who would have to pay the lower subscription," it shall be imperative that each district shall nominate a proprietor or other Member paying the higher subscription and a Tenant-Farmer or other Member paying the lower subscription every alternate year. In the notice calling the various Meetings, the Members in the district shall be informed whether the nomination of a proprietor or other Member paying the higher subscription or of a Tenant-Farmer or other Member paying the lower subscription must be made.

APPENDIX (B)

PREMIUMS

OFFERED BY

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND IN 1904

CONTENTS.

	PAGE
GENERAL NOTICE	3
CONSTITUTION AND MANAGEMENT	3
PRIVILEGES OF MEMBERS	4
ESTABLISHMENT FOR 1903-1904	5
COMMITTEES FOR 1903-1904	7
MEETINGS FOR 1904	9
EXAMINATIONS FOR 1904	10
AGRICULTURAL EDUCATION	11
VETERINARY DEPARTMENT	18
FORESTRY DEPARTMENT	18
DAIRY DEPARTMENT	25
CHEMICAL DEPARTMENT	29
BOTANICAL DEPARTMENT	36
GENERAL REGULATIONS FOR COMPETITORS	38

CLASS I.—REPORTS.

1. THE SCIENCE AND PRACTICE OF AGRICULTURE—FOR APPROVED REPORTS ON—
 1. Rural Economy abroad susceptible of being introduced into Scotland 39
 2. Other suitable subjects 39
2. ESTATE IMPROVEMENTS—FOR APPROVED REPORTS ON—
 1. General Improvement of Estates by Proprietors 39
 - 2, 3, and 4. Reclamation of Waste Land by Proprietors or Tenants 39
 - 5 and 6. Improvement of Natural Pasture by Proprietors or Tenants 40
3. HIGHLAND INDUSTRIES AND FISHERIES—FOR APPROVED REPORTS ON—
 1. Mode of treating Native Wool 40
4. MACHINERY—FOR APPROVED REPORTS 40

5. FORESTRY DEPARTMENT—FOR APPROVED REPORTS ON—	
1. Planting on Peat-bog	41
CLASS II.—DISTRICT COMPETITIONS.	
1. STOCK	41
2. DAIRY PRODUCE	46
3. SPECIAL GRANTS	47
4. MEDALS in aid of Premiums given by Local Societies	47
5. PLOUGHING COMPETITIONS	49
CLASS III.—COTTAGES AND GARDENS.	
1. PREMIUMS for BEST KEPT COTTAGES and GARDENS	50
2. MEDALS for COTTAGES and GARDENS or GARDEN PRODUCE and BEE-KEEPING	51
GENERAL SHOW AT PERTH IN 1904	55
GENERAL SHOW AT GLASGOW IN 1905	80
LIST OF MEMBERS ADMITTED IN JUNE 1903 AND JANUARY 1904	81

GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continuously directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of the United Kingdom are allowed to compete.
2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Associations.
3. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture; and by giving grants in aid of education in Agriculture and allied sciences. In 1900 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.
4. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Now terminated in accordance with arrangements with the Royal College of Veterinary Surgeons.
5. The institution of a National Examination in Dairying, jointly with the Royal Agricultural Society of England.
6. The institution of an Examination in Forestry for First and Second Class Certificates.
7. The appointment of a chemist for the purpose of promoting the application of science to agriculture, and to superintend local experiments.
8. The establishment of a Botanical Department.
9. The appointment of Entomologist to advise members regarding insect pests.
10. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.
11. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

- -

CONSTITUTION AND MANAGEMENT.

The general business of THE HIGHLAND AND AGRICULTURAL SOCIETY is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members—Nine nominated by the Charter, and Seven elected by the Society.

PRIVILEGES OF MEMBERS

MEMBERS OF THE SOCIETY ARE ENTITLED—

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.¹*
6. *To have Manures and Feeding-Stuffs analysed at reduced fees.*
7. *To have Seeds tested at reduced fees.*
8. *To have Insect Pests and Diseases affecting Farm Crops inquired into.*
9. *To attend and vote at General Meetings of the Society.*
10. *To vote for the Election of Directors, &c., &c.*

ANALYSIS OF MANURES AND FEEDING-STUFFS

The Fees of the Society's Chemist for Analyses made for Members of the Society shall, until further notice, be as follow :—

The estimation of one ingredient in a manure or feeding-stuff	: : : 5s.
The estimation of two or more ingredients in a manure or feeding-stuff	: : : 10s.

These charges apply only to analyses made for the sole and private use of Members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

The Society's Chemist, if requested, also supplies valuations of manures, according to the Society's scale of units.

SEEDS, CROP DISEASES, INSECT PESTS, &c.

The rates of charges for the examination of plants and seeds, crop diseases, insect pests, &c., will be had on application to the Secretary.

ELECTION OF MEMBERS

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

CONDITIONS OF MEMBERSHIP

The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s. Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £5, 5s., or, after ten annual payments have been made, by one payment of £3, 8s.² Subscriptions are payable on election, and afterwards annually in January.

Members are requested to send to the Secretary the names and addresses of Candidates they have to propose (stating whether the Candidates should be on the £1, 3s. 6d. or 10s. list).

JAMES MACDONALD, *Secretary.*

3 GEORGE IV. BRIDGE, EDINBURGH.

¹ Firms are not admitted as Members; but if one partner of a firm becomes a Member, the firm is allowed to exhibit at Members' rates.

² Candidates claiming to be on the 10s. list must state under which of the above designations they are entitled to be placed on it.

ESTABLISHMENT FOR 1903-1904

President.

THE EARL OF MANSFIELD, SCONE PALACE, PERTH.

Vice-Presidents.

THE MARQUIS OF TULLIBARDINE, M.V.O., D.S.O., Blair Castle, Blair Atholl.

THE EARL OF KINNOULL, Dupplin Castle, Perth.

Colonel H. S. HOME DRUMMOND of Blair-Drummond, Perthshire.

JOHN SPEIR, Newton Farm, Newton, Glasgow.

Ordinary Directors.

Year of
Election.

1900	WILLIAM TAYLOR, Park Mains, Renfrew.
	F. W. CHRISTIE, Dairsie Mains, Cupar-Fife.
	DAVID WILSON of Carbeth, Killearn.
	JOHN M'INTOSH DOBBIE, Campend, Dalkeith.
	THOMAS GORDON DUFF of Drummuir, Keith.
	ROBERT F. DUDGEON of Cargen, Dumfries.
	JOHN MACPHERSON GRANT, Old Milton, Kingussie.
	JOHN WILSON, Chapelhill, Lauder Road, Edinburgh.
	ST CLAIR CUNNINGHAM, Hedderwick Hill, Dunbar.
	ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.
1901	A. H. ANDERSON, Kippendavie Estate Office, Dunblane.
	THE EARL OF MANSFIELD, Scone Palace, Perth.
	CHARLES J. CUNNINGHAM, Wooden, Kelso.
	JOHN M'CAIG, Challock, Leswalt, Stranraer.
	WILLIAM DUTHIE, Tarves, Aberdeenshire.
	JOHN CRAN, Kirkton, Bunchrew, Inverness.
	JAMES STENHOUSE, Turnhouse, Cramond Bridge.
1902	WILLIAM CLARK, Netherlea Farm, Cathcart.
	J. ERNEST KERR, Harviestoun Castle, Dollar.
	ANDREW HUTCHESON, Beechwood, Perth.
	E. DOUGLAS PATON, Broomhill, Melrose.
	R. W. B. JARDINE, yr. of Castlemilk, Lockerbie.
	ALEXANDER M. GORDON of Newton, Inch, Aberdeenshire.
	J. DOUGLAS FLETCHER of Rosehaugh, Avoch, R.S.O., Ross-shire.
1903	R. SINCLAIR SCOTT, Burnside, Largs.
	Sir ROBERT D. MONCREIFFE of Moncreiffe, Bart., Bridge of Earn.
	JOHN MURRAY, Munnieston, Kippen Station, Stirling.
	Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Prestonkirk.
	JOHN MARR, Cairnbrogie, Old Meldrum.
	Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
	JONATHAN MIDDLETON, Clay of Allan, Fearn, Ross-shire.
	C. H. SCOTT PLUMMER of Sunderland Hall, Selkirk.

Extraordinary Directors.

- | | |
|------|---|
| | THOMAS LOVE, Lord Provost of Perth. |
| | SIR RALPH ANSTRUTHER of Balcaske, Bart., Pittenweem. |
| | SIR CHARLES E. ADAM of Blair-Adam, Bart., 5 New Square, Lincoln's Inn, London, W.C. |
| 1900 | JOHN A. DEWAR, M.P., Perth. |
| | ALEXANDER MACDUFF of Bonhard, Perth. |
| | CHARLES A. MURRAY of Taymount, Stanley, Perthshire. |
| | W. STEUART FOHERINGHAM, Murthly Castle, Murthly, Perthshire. |
| | ANDREW BALSTON, Glamis, Forfarshire. |
| | GEORGE DUN, Woodmill, Auchtermuchty. |
| | Colonel CHARLES MUNRO, Aberfeldy. |
| 1901 | CHARLES HOWATSON of Glenbuck, Glenbuck. |
| | W. T. MALCOLM, Dunmore Home Farm, Larbert. |
| | Captain D. G. CLAYHILLS HENDERSON of Invergowrie, R.N., Dundee. |
| | W. S. FERGUSON, Pictstonhill, Perth. |
| 1902 | R. SHIERA GIBB, Boon, Lauder. |
| | JOHN M. MARTIN, Murieston House, Mid-Caldor. |
| | C. M. CAMERON, Balnakyle, Munlochy, Ross-shire. |
| 1903 | ROBERT PATERSON, Hill of Drip, Stirling. |
| | GEORGE R. GLENDINNING, Hatton Mains, Kirknewton. |
| | JOHN BALLINGALL, Dunbog, Newburgh, Fife. |

Office-Beaters.

SIR JAMES H. GIBSON-CRAIG of Riccarton, Bart., *Treasurer*.
 SIR JOHN GILMOUR of Montrave, Bart., *Honorary Secretary*.
 JAMES MACDONALD, F.R.S.E., *Secretary*.
 Rev. ARCHIBALD SCOTT, D.D., *Chaplain*.
 ANDREW P. AITKEN, D.Sc., 8 Clyde Street, *Chemist*.
 WILLIAM HOME COOK, C.A., 42 Castle Street, *Auditor*.
 TODS, MURRAY, & JAMIESON, W.S., *Law Agents*.
 A. N. M'ALPINE, 6 Blythswood Square, Glasgow, *Consulting Botanist*.
 R. S. MACDOUGALL, M.A., D.Sc., 13 Archibald Place, *Consulting Entomologist*.
 JOHN MACDIARMID, *Clerk*.
 EDWARD M. COWIE, *Second Clerk*.
 WILLIAM BLACKWOOD & SONS, 45 George Street, *Printers and Publishers*.
 KEITH & Co., 43 George Street, *Advertising Agents*.
 G. WATERSTON & SONS, 35 George Street, *Stationers*.
 THOMAS SMITH & SONS, 47 George Street, *Silversmiths*.
 ALEXANDER KIRKWOOD & SON, 9 St James' Square, *Medallists*.
 JOHN WATHERSTON & SONS, *Inspectors of Works*.
 WILLIAM SIMPSON, *Messenger*.

Chairman of Board of Directors.

THE EARL OF MANSFIELD.

Chairmen of Committees.

- | | |
|--------------------------------------|------------------------------------|
| 1. <i>Argyll Naval Fund</i> | Captain G. D. CLAYHILLS HENDERSON. |
| 2. <i>Finance, Chambers, and Law</i> | SIR JAMES H. GIBSON-CRAIG, Bart. |
| 3. <i>Publications</i> | Right Rev. JOHN GILLESPIE, LL.D. |
| 4. <i>Shows</i> | SIR JAMES H. GIBSON-CRAIG, Bart. |
| 5. <i>Science</i> | DAVID WILSON of Carboth. |
| 6. <i>General Purposes</i> | SIR JAMES H. GIBSON-CRAIG, Bart. |
| 7. <i>National Diplomas</i> | Right Rev. JOHN GILLESPIE, LL.D. |
| 8. <i>Forestry</i> | THE EARL OF MANSFIELD. |

COMMITTEES FOR 1903-1904

1. ARGYLL NAVAL FUND.

Capt. G. D. CLAYHILLS HENDERSON of Invergowie, R.N., Dundee, *Convener*.
 Sir DAVID BAIRD of Newbyth, Bart., Prestonkirk.
 J. PATTEN MACDOUGALL, 39 Heriot Row, Edinburgh.
 JOHN MACLACHLAN of Maclachlan, 48 Castle Street, Edinburgh.

2. FINANCE, CHAMBERS, AND LAW.

Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart., *Convener*.
 The EARL OF MANSFIELD, Soane Palace, Perth.
 Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
 G. R. GLENDINNING, Hatton Mains, Kirknewton.
 ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.
 A. M. GORDON of Newton, Inch, Aberdeenshire.
 JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
 W. S. FERGUSON, Pictstonhill, Perth.
 Sir RALPH ANSFUTHER of Balcaskie, Bart., Pittenweem.
 Sir JOHN GILMOUR of Montrave, Bart., Hon. Secretary, *ex officio*.
 WILLIAM HOME COOK, U.A., Auditor, *ex officio*.

3. PUBLICATIONS.

Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.,
Convener.
 Dr A. P. AITKEN, 8 Clyde Street, Edinburgh.
 JOHN SPEIR, Nowlon Farm, Newton, Glasgow.
 DAVID WILSON of Carbeth, Killearn.
 R. SHIRRA GIBB, Boon, Lauder.
 Sir ROBERT D. MONCREIFFE of Moncreiffe, Bart., Bridge of Earn.
 JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.

4. SHOWS.

Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart., Currie, *Convener*.
 ALEX. M. GORDON of Newton, Inch, Aberdeenshire, *Vice-Convener*.
 JOHN CRAN, Kirkton, Bunchrew, Inverness.
 Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
 Sir JOHN GILMOUR of Montrave, Bart., Leven.
 JOHN MARR, Cairnbrogie, Old Meldrum.
 JONATHAN MIDDLETON, Clay of Allan, Fearn.
 R. SINCLAIR SCOTT, Burnside, Largs.

W. S. FERGUSON, Pictstonhill, Perth.
 ALEX. CROSS of Knockdon, 19 Hope Street, Glasgow.
 W. T. MALCOLM, Dunmore Home Farm, Larbert.
 J. D. FLETCHER of Rosehaugh, Avoch, R.S.O., Ross-shire.
 C. M. CAMERON, Balnakyle, Munlochy.
 JOHN WILSON, Chapelhill, Lauder Road, Edinburgh.
 WILLIAM DUTHIE, Tarves, Aberdeenshire.
 ROBERT F. DUDGEON of Cargen, Dumfries.
 JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
 JOHN M'CAIG, Challoch, Leswalt.
 R. W. B. JARDINE, yr. of Castlemilk, Lockerbie.
 WILLIAM CLARK, Netherlea Farm, Cathcart.
 Sir ROBERT D. MONCREIFFE of Moncreiffe, Bart., Bridge of Earn.
 JOHN MURRAY, Munnieston, Kippen Station, Stirling.
 WILLIAM TAYLOR, Park Mains, Renfrew.
 F. W. CHRISTIE, Dairsie Mains, Cupar-Fife.
 A. H. ANDERSON, Kippendavie, Dunblane.
 CHARLES HOWATSON of Glenbuck, Glenbuck.
 ST CLAIR CUNNINGHAM, Hedderwick Hill, Dunbar.
 CHARLES J. CUNNINGHAM, Wooden, Kelso.
 JAMES STENHOUSE, Turnhouse, Cramond Bridge.
 E. DOUGLAS PATON, Broomhill, Melrose.
 J. ERNEST KERR, Harviestoun Castle, Dollar.
 JOHN M. MARTIN, Murieston House, Mid-Calder.
 THOMAS GORDON DUFF of Drummuir, Keith.
 ROBERT PATERSON, Hill of Drip, Stirling.

5. SCIENCE.

DAVID WILSON of Carbeth, Killearn, *Convener*.
 JONATHAN MIDDLETON, Clay of Allan, Fearn, Ross-shire, *Vice-Convener*.
 The EARL OF MANSFIELD, Scone Palace, Perth.
 R. SHIRRA GIBB, Boon, Lauder.
 W. S. FERGUSON, Pictstonhill, Perth.
 JOHN SPEIR, Newton Farm, Newton, Glasgow.
 ANDREW HUTCHESON, Beechwood, Perth.
 ALEX. CROSS of Knockdon, 19 Hope Street, Glasgow.
 Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
 JOHN WILSON, Chapelhill, Lauder Road, Edinburgh.
 Sir JOHN GILMOUR of Montrave, Bart., Leven, Fife.
 Sir RALPH ANSTRUTHER of Balcaskie, Bart., Pittenweem.
 JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
 JOHN M'CAIG, Challoch, Leswalt.
 C. H. SCOTT PLUMMER of Sunderland Hall, Selkirk.
 JAMES STENHOUSE, Turnhouse, Cramond Bridge.
 JOHN BALLINGALL, Dunbog, Newburgh, Fife.
 Dr AITKEN, Chemist, *ex officio*.
 A. N. M'ALPINE, Botanist, *ex officio*.

6. GENERAL PURPOSES.

Sir JAMES H. GIBSON-CRAIG of Riccarton, Bart., Currie, *Convener*.
 The EARL OF MANSFIELD, Scone Palace, Perth.
 G. R. GLENDINNING, Hatton Mains, Kirknewton.
 ALEX. M. GORDON of Newton, Inch, Aberdeenshire.
 Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
 JOHN M. MARTIN, Murieston House, Mid-Calder.
 JOHN M'HUTCHEN DOBBIE, Campend, Dalkeith.
 Sir ARCHIBALD BUCHAN HEPBURN of Smeaton, Bart., Prestonkirk.
 Sir JOHN GILMOUR of Montrave, Bart., Leven, *ex officio*.

7. NATIONAL DIPLOMAS—Joint Board.

Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.,
Convener.

ALEX. CROSS of Knockdon, 19 Hope Street, Glasgow.

JOHN SPIER, Newton Farm, Newton, Glasgow.

DAVID WILSON of Carbeth, Killeain.

The CHAIRMAN OF THE BOARD.

JAMES MACDONALD, *Secretary.*

8. FORESTRY.

The EARL OF MANSFIELD, Scone Palace, Perth, *Convener.*

The MASTER OF POLWARTH, Humber House, Upper Keith.

Sir JOHN GILMOUR of Montrave, Bart., Leven.

Sir ARCHIBALD BUCHAN HEBURN of Smeaton, Bart., Prestonkirk.

A. M. GORDON of Newton, Inch, Aberdeenshire.

R. C. MUNRO FERGUSON of Raith, M.P., Kirkcaldy.

JOHN METHVEN, 15 Princes Street, Edinburgh.

Colonel F. BAILEY, 7 Drummond Place, Edinburgh.

DAVID KEIR, Ladywell, Dunkeld.

JOHN MICHIE, Balmoral, Ballater.

A. PITCAITHLEY, Jeanie Bank, Old Scone, Perth.

The President, Vice-Presidents, the Treasurer, Honorary Secretary, and Chairman of Directors are members *ex officio* of all Committees.

West of Scotland Agricultural College.

Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.

JOHN M. MARTIN, Murieston House, Mid-Calder.

Edinburgh and East of Scotland College of Agriculture.

R. SHIRRA GIBB, Boon, Lauder.

JAMES MACDONALD, *Secretary.*

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, in the Society's Hall, 3 George IV. Bridge, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show. This year it will be held at Perth, on Wednesday, 20th July, at an hour to be announced in the programme of the Show.

With reference to motions at General Meetings, Bye-Law No. 10 provides—"That at General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given a week previously

to the Board of Directors, without prejudice, however, to the competency of making such motion or proposal to the effect of its being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

General Show at Perth—19th, 20th, 21st, and 22nd July.—Entries close for Implements, 16th May; Stock, Poultry, and Dairy Produce, 13th June.

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November till June inclusive, at half-past one o'clock P.M., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Districts on the Board for the year 1904-1905, will be held at the places and on the days after mentioned:—

- | | |
|--|--------------------------------|
| 1. Edinburgh, 3 George IV. Bridge, | Wednesday, 10th Feb., at 2. |
| 2. Glasgow, North British Station Hotel, | Wednesday, 17th Feb., at 1. |
| 3. Stirling, Golden Lion Hotel, | Thursday, 18th Feb., at 1.30. |
| 4. Dumfries, King's Arms Hotel, | Wednesday, 24th Feb., at 1. |
| 5. Perth, Salutation Hotel, | Friday, 26th February, at 2. |
| 6. Kelso, Cross Keys Hotel, | Friday, 4th March, at 12.30. |
| 7. Aberdeen, Imperial Hotel, | Friday, 11th March, at 2. |
| 8. Inverness, Station Hotel, | Tuesday, 15th March, at 12.30. |

The nomination of Proprietors or other Members paying the higher subscription must be made in the 3rd, 4th, 7th, and 8th Districts; and the nomination of Tenant-Farmers or other Members paying the lower subscription, in the 1st, 2nd, 5th, and 6th Districts.

Committee Meetings.—Meetings of the various Committees are held as required.

EXAMINATIONS.

Agriculture.—The Examination for 1904 for the National Diploma in Agriculture will be held at the Yorkshire College, Leeds, on Monday, 9th May, and following days. Entries close on 31st March.

Forestry.—The next Examination for the Society's Certificate in Forestry will be held in April 1905.

Dairy.—The Examination for 1904 for the National Diploma in Dairying will be held at the Kilmarnock Dairy School, on Monday, 26th September, and following days. Entries close on 31st August.

AGRICULTURAL EDUCATION

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture, winners of the Diploma (F.H.A.S.) being elected Free Life Members of the Society.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint-Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.) This Examination is now conducted under the management of the "National Agricultural Examination Board" appointed by the two Societies. In the year 1903, on the invitation of the two Societies, the Board of Agriculture and the Scotch Education Department agreed to appoint a representative from each to act on the Examination Board. Dr Somerville represents the former and Mr John Struthers, C.B., the latter body. The following are the representatives appointed by the Highland and Agricultural Society for the current year, viz. :—

Right Rev. JOHN GILLESPIE, LL.D., Mouswald Manse, Ruthwell, R.S.O.
DAVID WILSON of Carbeth, Killearn.

ALEXANDER CROSS of Knockdon, 19 Hope Street, Glasgow.

JOHN SPEIR, Newton Farm, Newton, Glasgow.

THE CHAIRMAN OF BOARD OF DIRECTORS.

JAMES MACDONALD, *Secretary*.

REGULATIONS AND SYLLABUS OF THE EXAMINATION FOR THE NATIONAL DIPLOMA IN THE SCIENCE AND PRACTICE OF AGRICULTURE.

REGULATIONS.

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral Examinations.

4. The Examination must be taken in Two Parts as follows :—

First Part.

1. Mensuration and Land Surveying.
2. Agricultural Botany.
3. General Chemistry.
4. Geology.
5. Agricultural Entomology.

Second Part.

6. Practical Agriculture.
7. Agricultural Book-keeping.
8. Agricultural Chemistry.
9. Agricultural Engineering.
10. Veterinary Science.

5. The maximum number of marks obtainable and the minimum number of marks in each subject qualifying for the Diploma will be as follows :—

First Part—

SUBJECT.	Max. No. of Marks.	Pass Marks for Diploma.
1. Mensuration and Land Surveying	200	120
2. Agricultural Botany	200	120
3. General Chemistry	100	60
4. Geology	100	50
5. Agricultural Entomology	100	50

Second Part—

6. Practical Agriculture	500	300
7. Agricultural Book-keeping	200	120
8. Agricultural Chemistry	200	120
9. Agricultural Engineering	200	120
10. Veterinary Science	100	50

6. A Candidate who obtains not less than three-fourths (1425) of the aggregate maximum marks (1900) in the entire Examination will receive the Diploma with Honours, provided (a) that he passes each of the two Parts of the Examination at the first attempt, and (b) that he obtains not less than three-fourths (375) of the maximum marks (500) in the subject of Practical Agriculture.

7. A Gold Medal will be awarded to the Candidate on the Honours List who obtains the highest number of total marks in the whole Examination.

8. A Candidate will not be entitled to take both Parts of the Examination at one time. A year at least must elapse between the passing of the First Part and sitting for the Second Part; and the Second Part must, except with the special permission of the Board, be taken within two years of the passing of the First Part.

9. A non-returnable fee of £1 will be required from each Candidate for each Part of the Examination.

N.B.—*This Regulation will not apply in 1904 to Candidates for Part II.; they will be required to pay a deposit of £1, which will be returned to those who pass the Examination at the first attempt.*

10. A Candidate who fails to obtain Pass marks in any of the subjects in the Part for which he is sitting must take the entire Part again.

11. Holders of both the First Class Certificate of the Royal Agricultural Society of England and the Diploma of the Highland and Agricultural Society of Scotland will not be eligible for this Examination.

12. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular Candidate to the Examination.

The Examination of 1904 will take place in the Great Hall of the Yorkshire College, Leeds, on Monday, 9th May 1904, and following days. Forms of application for permission to sit at the Examination may be obtained from either of the undersigned, and must be returned duly filled up not later than Monday, the 30th March 1903, when the Entries will close.

BY ORDER,

ERNEST CLARKE,

Secretary, Royal Agricultural Society of England,
13 HANOVER SQUARE, LONDON, W.

JAMES MACDONALD,

Secretary, Highland and Agricultural Society of
Scotland,

3 GEORGE IV. BRIDGE, EDINBURGH.

SYLLABUS OF SUBJECTS OF EXAMINATION.

FIRST PART.

I.—AGRICULTURAL BOTANY.

1. *Morphology*.—The structure of plants. The principles of classification. The Natural Orders (Phanerogams and Cryptogams) dealing specially with those of importance to the Agriculturist.

2. *Physiology*.—The life of the plant. Organs and their functions—nutritive and reproductive.

3. *Pathology*.—Diseases of plants, and their causes. Parasites—Phanerogams, Fungi, Bacteria. Prevention and cure.

4. *Cultivation*.—Conditions in plant life favourable to (a) the improvements of cultivated plants, and (b) the destruction of weeds. New varieties of plants. Pastures. Pruning.

N.B.—*Candidates will be required to identify plants usually found on a farm.*

II.—MENSURATION AND LAND SURVEYING.

1. Ordinary rules of superficial and solid mensuration. Volume of a prismoid. Applications to practical questions. Estimation of weights of bodies whose dimensions and specific gravity are known.

2. Land surveying by chain. Plotting from field-book, and determination of areas surveyed. The simpler "field problems."

3. The use and adjustment of instruments employed in Surveying and Levelling.

4. Levelling and plotting from field-book.

5. A sufficient knowledge of Trigonometrical Surveying for the determination of heights and distances by Theodolite; as essential to this, solution of plane triangles by the aid of Logarithmic Tables.

6. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

N.B.—*Each candidate should have with him at the Examination a pair of compasses, scales of equal parts, including a scale of one chain to an inch, and the scale fitting the Ordnance map, $\frac{1}{8000}$, or $25\frac{3}{4}$ inches to the mile, a small protractor, a set square, and a straight-edge about 18 inches in length.*

III.—GENERAL CHEMISTRY.

1. *The Chemical Elements*.—Definition and classification of elements. Occurrence in nature and leading characters of the elements most commonly met with.

2. *Common Chemical Compounds*.—Preparation and properties of common products of inorganic chemistry (such as the mineral acids, alkalies, salts, &c.)

3. *Laws and Theory*.—The laws of chemical combination. Explanation of equivalence. Distinction of chemical and mechanical compounds. Laws of gaseous diffusion. The atmosphere. Theory of combustion.

4. *Analysis*.—Qualitative and quantitative analysis of atmospheric air. Quantity of air required in combustion. Qualitative analysis of common inorganic substances: Quantitative analysis in simple cases (such as the determination of strength of solutions, proportions of acids and bases in simple salts) by volumetric and gravimetric methods. Ultimate organic analysis by combustion. Proximate analysis by solvents; dialysis and fractional distillation.

5. *Carbon Compounds*.—Ordinary alcohol and ether, and the most common ethylic salts. Oxalic acid, lactic acid, acetic acid and its homo-

logues, fats, glycerine, and soap. Paraffins. Phenol. Cyanogen and its most common compounds, urea, and uric acid. Saccharine and amylaceous compounds. Turpentine and resin. Tannin. Albumen. Gelatine. Fermentation.

N.B.—*In this section exact knowledge of general principles and typical compounds is expected, rather than diffuse information.*

IV.—GEOLOGY.

1. Chief minerals entering into the composition of rocks. Origin and composition of aqueous and igneous rocks. General principles of the classification of rocks. Leading divisions of the stratified rocks, and their geographical distribution in the British Islands.

2. Stratification, cleavage, and faulting of rocks.

3. Influence of the geological structure of a country on the configuration of the land and the composition of the soil. Relation of Strata to water-supply and drainage. Origin of springs.

4. The various mineral manures, their sources, characters, and mode of occurrence.

5. Different kinds of building-stones and road materials. Distribution of the various economical substances.

N.B.—*Candidates will be required to name and describe common rocks, minerals, and fossils, and to show some knowledge of geological maps and sections.*

V.—AGRICULTURAL ENTOMOLOGY.

1. The position of Insects in the Animal world, with the characters that mark them out from related animal groups.

2. *General Structure of Insects*.—Head, Thorax, Abdomen, Alimentary Canal, Circulation, Respiratory System, Nervous System and Sense Organs, Reproductive System.

3. *Metamorphosis of Insects*, with the economic importance of the different stages.

4. *Classification of Insects*.—The general characters of the following Natural Orders: Coleoptera, Lepidoptera, Hymenoptera, Diptera, Hemiptera, Orthoptera, Neuroptera.

5. *Larvæ*.—Their varying forms as a help to identification.

6. The *Life-history* of the Insects, Worms, and Acarines injurious to Food Crops generally and to Live Stock. Recognition of the common pests by external characters and by their work.

7. Insects useful in Agriculture.

8. Circumstances favouring Insect increase. Farm practice in relation to the discouraging of Insect attack.

9. *Preventive and Remedial Measures*.—Encouragement of Insect-eating birds and mammals. Fungoid diseases of Insects. Artificial remedies. Insecticides and their composition and preparation.

N.B.—*Practical acquaintance with common insects, worm parasites, &c., will be expected. Where the Candidate is not acquainted with the scientific name of an Insect, the generally received English name will be accepted.*

SECOND PART.

VI.—PRACTICAL AGRICULTURE.

1. *Soils*.—Classification of soils—characters and composition—suitability for cultivation.

2. *Improvement of Soil*.—Drainage, Irrigation, and Warping. The application of lime—marl—clay—ashes, &c.

3. *Rotations*.—The principles of rotations—rotations suitable for different soils and climates—systems of farming.

4. *Manures*.—The properties of manures—general and special—amounts used per acre—period and mode of application—treatment and disposal of sewage.

5. *Food-stuffs*.—The properties of feeding substances—their suitability for different classes of farm stock—considerations affecting their use—rations for different classes of stock.

6. *Crops*.—Farm crops (cereals, agricultural grasses and clovers, forage plants and roots). How they grow—their cultivation, including cleaning, harvesting, and storage—diseases—insect injuries and remedies.

7. *Weeds and Parasitic Plants*.—Best methods of eradication.

8. *Pests of the Farm*.—Injuries to crops and live stock of the farm due to mammals, birds, and insects, with their prevention and remedies.

9. *Weather*.—Meteorology, or the effect of climate on farming conditions.

10. *Live Stock*.—The breeding, rearing, feeding, and general treatment of farm stock—the different breeds of horses, cattle, sheep, pigs, and poultry—their characteristics—the districts where they are generally met with.

11. *Milk*.—The production and treatment of milk—the manufacture of cheese, butter, &c.—the utilisation of by-products.

12. *Machinery*.—The uses and prices of the machines and implements used in farming in different parts of Great Britain.

13. *Buildings*.—Buildings required on different classes of farms in various districts.

14. *Farming Capital*.—Calculations of the cost of stocking and working arable, stock, and dairy farms. Farm valuations. Rent, taxes, and cost of labour.

N.B.—*It is essential that a Candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm routine. Candidates will be expected to illustrate their answers when necessary by intelligible sketches or diagrams.*

VII.—AGRICULTURAL BOOK-KEEPING.

1. *Agricultural Book-keeping*.—Description of books to be kept, with examples.

2. *Valuation of stock and effects*.

3. *Profit and Loss, and Balance Sheet*.

VIII.—AGRICULTURAL CHEMISTRY.

1. *Soil*.—The origin, formation, and classification of soils. The constituents of soils. The supply of plant-food by the soil. The chemical and physical properties of soils of different kinds. The adaptation of soils to particular crops. The relations of air and water to soils. Nitrification and the biology of the soil. The chemical and physical effects of tillage operations and drainage. The improvement of soils. Causes of infertility. Mechanical and chemical analysis of soils.

2. *Plant-life*.—The constituents of plants. The relations of atmosphere, rainfall, heat, and light to vegetation. The sources of plant-food.

3. *Manures*.—The supply of plant-food by manure. The improvement of the soil by manuring. The classification of manures as regards their composition, nature, and use. The manures in general use upon the farm. Farmyard manure and other natural manures. Green-manuring. Liming, marling, claying. Artificial manures, their origin and manufacture. The changes which manures undergo in the soil. The influence

of drainage. The application of manures. The analysis of manures. The adulteration of manures.

4. *Crops*.—The composition of the principal farm crops. Characteristics of particular kinds of crops. The influence of climate and season. The manuring of particular crops. The changes that take place in crops during the various stages of their growth. Rotation of crops.

5. *Foods*.—The constituents of foods, and their functions. The nutritive value and digestibility of foods. The chemical composition and use of the principal feeding-stuffs employed on the farm, and the sources of their supply. The main facts regarding respiration and digestion. The relation of foods to the production of work, meat, milk, and manure. The adaptation of foods to special requirements. The residual manurial value of foods, and the circumstances affecting it. The estimation of unexhausted fertility. Analysis and adulteration of foods.

6. *Water*.—Rain-water. Hard and soft waters. Drinking waters. Irrigation and sewage.

7. *Dairying*.—The composition of milk, and the conditions which influence its quality and supply. Cream and cream-separation. Butter and butter-making. Cheese and cheese-making. The influence of ferments on milk and milk products. The preservation of milk. Milk-testing.

IX.—AGRICULTURAL ENGINEERING.

1. *Heat*.—Nature of heat; thermometer; absolute zero; specific heat; latent heat; the unit of heat. Total heat of water; as ice, water, and steam. Conduction, convection, and radiation of heat. Mechanical equivalent of heat. Principle of combustion. Quantity of heat generated by combustion. Modes of transforming heat of combustion into power, as in the steam-engine, and gas and oil engine.

2. *Air*.—Properties of air; elasticity, specific heat. Barometer. Moisture. Movement. Winds. Windmills.

3. *Water*.—Composition. Weight. Height of column to balance atmosphere. Flow of water. Friction of water in pipes and channels. Usual speed of flow. Power derived from falls of water. Water-wheels; turbines; water-pressure engines; pumps. Potable water. Sources of supply. Means of purification. Storage.

4. *Mechanics*.—Centre of gravity; stability of structures. The lever; toothed wheels; pulleys and ropes; wrapping connectors; winches; differential pulleys. Laws of motion. Strength of materials, tensile, compressive, torsional, and transverse; elastic limit; ultimate strength. Work; horse-power; animal and human power. Friction of surfaces and axles; lubrication.

5. *Steam-engine*.—Construction of an ordinary portable-engine boiler, of a Cornish boiler, and its setting. Fittings of a boiler. Construction of the stationary and portable steam-engine. Single cylinder. Double cylinder. Compound. Slide-valve. Expansion valve. Cylinder. Piston-rod. Glands. Connecting-rod. Crank and crank shaft. Fly-wheel. Bearings. Pet cocks. Lubrication. Steam and fuel consumed per horse-power.

6. *Gas and Petroleum Engines*.—Principle of action. Construction of valve-gear. Sources of loss. Fuel and water required per horse-power.

7. *Electrical Generators, Motors, and Conductors*.—Principles of action—shunt; losses in electrical machinery. Efficiency. Detection of faults. Regulation of shunt and series motors. Use of fuses and cut-outs. Horse-power of motors, and calculation of Watts to be delivered at terminals. Ohm's law. Losses in conductors, and calculation of sizes to convey given currents with definite losses. Jointing and insulation of conductors.

8. *Construction of Agricultural Implements.*—The mode of action and the general principles involved in the construction of farm implements. The adjustments of implements for different descriptions of work. Lubrication. Working or wearing parts.

9. *Cultivating Implements worked by Steam Power.*

10. *Horse-cultivating Implements.*—Ploughs. Cultivators or Grubbers. Harrows. Rollers. Scrubbers, &c.

11. *Sowing Implements.*—Drills. Manure and water drills. Broadcast barrows. Broadcasters. Manure distributors. Potato planters, &c.

12. *Hoeing Implements.*—Horse-hoes. Scufflers.

13. *Securing of Crops.*—Reaping machines. Mowing machines. Hay-makers. Horse-rakes. Elevators. Silage appliances. Potato raisers, &c.

14. *Carriages.*—Carts. Waggon. Sleighs. Rick-lifters, &c.

15. *Preparing Crops for Market.*—Threshing machines. Winnowing machines. Corn screens. Hummellers. Hay and straw presses, &c.

16. *Preparing Foods.*—Mills. Chaff-cutters. Pulpers. Turnip-cutters. Cake-breakers. Cooking apparatus.

17. *Dairy Appliances.*—Cream separators. Churns. Butter-workers. Cheese tubs. Curd mills. Cheese presses. Setting-pans. Refrigerators, &c.

18. *Land Improvement.*—Drainage instruments. Limekilns. Arrangements of shafting, pulleys, clutches, &c., for farm machinery at home-steads.

N.B.—*Marks will be given for neatness and accuracy of Drawing.*

X.—VETERINARY SCIENCE.

1. Anatomy and Physiology, including the comparative anatomy of the bones of the animals of the farm, and the structure and functions of the different organs and tissues of the horse, ox, sheep, and pig.

2. The digestive processes and principles of nutrition in the above animals.

3. A general knowledge of the blood and its circulation, and the processes of respiration, secretion, and excretion.

4. The physiology of reproduction, and its bearings on healthy breeding.

5. The period of gestation in the mare, cow, ewe, and sow, and the special management of these animals prior to, at the time of, and after parturition.

6. The management of farm stock in health and disease.

PAST EXAMINATION PAPERS.

Copies of the Papers set at the Examinations in 1900, 1901, 1902, and 1903 may be had on application. Price 6d. per set.

VETERINARY DEPARTMENT

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become Members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of Students who passed for the Society's Certificate is 1183.

The Society votes annually eleven silver medals for Class Competition to each of the two Veterinary Colleges in Edinburgh, and to the one in Glasgow.

FORESTRY DEPARTMENT

The Society grants FIRST and SECOND CLASS CERTIFICATES in FORESTRY.

In 1900 it was resolved that the examination in Forestry be held in 1901, and thereafter every alternate year.

Candidates must possess—1. A thorough acquaintance with the theory and practice of Forestry. 2. A general knowledge of the following branches of study, so far as these apply to Forestry: The Elements of Botany; The Elements of Physics, Chemistry, and Meteorology; Forest Entomology; Forest Engineering, including Land and Timber Measuring and Surveying; Mechanics and Construction, as applied to fencing, draining, bridging, road-making, and saw-mills; Implements of Forestry; Book-keeping and Accounts.

The examinations¹ are open to candidates of any age, will be both written and oral, and will include such practical tests as may from time to time be found convenient to apply.

The maximum number of marks for each subject is 100; First-Class marks in all subjects 75, Second-Class marks in all subjects 50, Pass marks in all subjects 40.

To obtain the *First-Class Certificate* a Candidate must have First-Class marks in Forestry and any two of the other subjects, and Pass in the two remaining subjects. To obtain the *Second-Class Certificate* a Candidate must obtain Second-Class marks in Forestry and in any two of the other subjects, and Pass in the two remaining subjects.

If a Candidate has obtained First-Class marks in Forestry and failed to obtain First-Class marks in only one or two of the other subjects, he can come up again for examination in these subjects alone for the *First-Class Certificate*, otherwise he must go through the entire examination again.

The list of students who obtained Certificates prior to 1899 appears in the 'Transactions,' Fifth Series, vol. xi. (1899).

The following have obtained First-Class Certificates:—

ERIC ARTHUR NOBBS, Edinburgh,	1899
GEORGE POTTS, Whitchurworth, Trimdon Grange, Durham,	1899
DUNCAN S. RABAGLIATI, 1 St Paul's Road, Bradford,	1901
FRANK SCOTT, Dumfries House Mains, Cumnock,	1903

¹ The next Examination will be held in the spring of 1905.

The following have obtained Second-Class Certificates.—

WILLIAM BRUCE, Buxton Cottage, Laurencekirk, . . .	1901
RATAPPIER SWAMINATHAN, 56 Jesus Lane, Cambridge, . . .	1901
THOMAS UHNER, Couthill, Hawick,	1901
ALEXANDER MITCHELL, Braidwood, Gorebridge, . . .	1903

SYLLABUS OF EXAMINATION

I.—SCIENCE OF FORESTRY AND PRACTICAL MANAGEMENT OF WOODS.

I. *Principles of Scientific Forestry*.—1. Effects of heat, light, moisture, and air-currents on forest vegetation. 2. Effects of depth, porosity, moisture, and chemical composition of the soil on forest vegetation. 3. Effects of forest vegetation on the soil and air. 4. Rate and extent of development, longevity, and reproductive power of trees. 5. Pure and mixed woods. 6. Systems of silviculture.

II. *Practical Management of Woods*.—7. Draining and irrigation. 8. Choice of species for various situations. 9. Seed and sowing, including nurseries. 10. Planting. 11. Natural regeneration by seed, shoots, and suckers. 12. Formation of mixed woods. 13. Tending of young woods. 14. Pruning. 15. Thinning. 16. Silvicultural characteristics of the principal trees.

III. *Injuries by Storms and Fires*.—17. Storms. 18. Fires.

IV. *Timber*.—19. Its technical properties. 20. Its defects. 21. Recognition of different kinds of timber. 22. Processes for increasing its durability.

V. *Utilisation of Produce*.—23. Uses of wood and other produce. 24. Felling. 25. Conversion. 26. Seasoning. 27. Transport. 28. Sales. 29. Harvesting of bark.

VI. *Forest Organisation*.—30. General ideas regarding a regulated system of forest management.

II.—FOREST BOTANY AND FOREST ZOOLOGY.

(a) FOREST BOTANY.

The fundamental facts of morphology, physiology, and classification of plants. The structure and function of the plant-cell and the plant-tissues. Their primary distribution. The secondary changes they exhibit in consequence of perennation.

The structure and function of the root and shoot in flowering-plants. Buds, their forms and uses. The flower. The fruit. The seed.

The structure and function of vegetative and reproductive organs of fungi.

Relationship of plants to air, soil, and water. Effect of light, heat, and mechanical agencies upon plants. Nutrition. The nature and elements of the food of plants. Sources of plant-food. The absorption,

elaboration, transference, and storage of food. Respiration and transpiration. Parasites and saprophytes. Symbiosis.

Growth of plants in length and thickness. Correlation of growth, pruning. Germination of seeds. Formation of wood and bark. Healing of wounds.

Diseases of plants due to faulty nutrition and unfavourable circumstances of growth. Diseases due to attacks of fungi.

Natural reproduction and propagation by seeds and by buds. Fertilisation of flowers. Hybridisation. Artificial propagation by budding, grafting, layering, and cutting.

The characters of the large groups and classes of the vegetable kingdom. The characters of the families of plants which include the chief timber trees. The botanical characteristics of the principal British forest-trees (including the structural features of their wood). The weeds of the forest and their significance.

(b) FOREST ZOOLOGY.

The group Insecta: its position in the animal kingdom. Structure, mode of reproduction, and metamorphosis of insects. The outlines of classification of the group. Conditions favourable to the numerical increase of insects. Natural checks to increase (*e.g.*, birds, mammals, parasitic insects). The identification and life-history of the more important insects injurious to forest-trees and fruit-trees. The damage caused by these insect pests and their mode of attack. The damage caused by animals. Preventive and remedial measures.

III.—PHYSICS, CHEMISTRY, AND METEOROLOGY.

Physics.

Mass, weight, specific gravity, solid, liquid, and gaseous states of matter. Capillarity, osmose, vapour tension, suction pump, force pump, syphon, barometer, atmospheric pressure. Boyle's law. Levers and pulleys. Heat, measurement of heat, specific heat; transference of heat by conduction, convection, and radiation. Boiling and freezing. Latent heat. The thermometer. The conservation and transformation of energy. Light—reflection, refraction, polarisation; the spectrum. The rudiments of electricity and magnetism.

Chemistry.

Elements. Oxygen, hydrogen, nitrogen;—their preparation, properties, and chief compounds. Acids, bases, salts. Combustion, oxidation, reduction. Sulphur, Carbon, Phosphorus; and their compounds, with oxygen and hydrogen. Metals—potassium, sodium, calcium, magnesium, aluminium, iron, copper, lead, mercury, and their chief compounds. Carbohydrates, marsh gas, olefiant gas, alcohol, acetic acid, oxalic acid. Distillation of wood and coal.

Meteorology.

The atmosphere, its composition and physical properties. Measurement of pressure and temperature. The barometer. Rain, hail, snow, fog, cloud, dew, the dew point, hoar frost. The weathering of rocks and soils. Gases injurious to vegetation.

IV.—FOREST ENGINEERING, INCLUDING LAND AND TIMBER MEASURING AND SURVEYING; MECHANICS AND CONSTRUCTION AS APPLIED TO FENCING, BRIDGING, ROAD-MAKING, AND SAW-MILLS.

1. The use of the level and measuring-chain. Measuring and mapping surface areas. 2. The measurement of solid bodies—as timber, stacked bark, fagots, &c., earthwork. 3. The different modes of fencing and enclosing plantations; their relative advantages, durability, cost of construction, and repairs. 4. The setting out and formation of roads for temporary or permanent use. 5. The construction of bridges over streams and gullies; of gates or other entrances. 6. The construction and working of estate saw-mills.

V.—BOOK-KEEPING AND ACCOUNTS.

1. Questions in Practice, Proportion, and Decimal Fractions. 2. Book-keeping—describe books to be kept; and best method of valuing timber. 3. Practical questions in Book-keeping will also be given.

EXAMINATION PAPERS, 1903

PRACTICAL FORESTRY.

1. In a plantation about 120 years of age, the crop consists of hardwoods, with patches of larch, Scots fir, and spruce. The hardwoods are healthy but the other varieties of trees show signs of decay. To what causes of decay are these trees most liable? Explain the best method of dealing with the plantation.

Adjoining the plantation is a piece of new ground, 10 acres in extent, which is proposed to be embraced with the plantation. It is to be planted with a mixture of one-third larch, one-third Scots fir, and one-third hardwoods (oak, beech, elm, and ash). Mention how many trees should be planted per acre, the size of the plants to be used, the price per 1000 of each variety, and the cost of planting.

2. A proprietor is about to enclose for planting purposes a square piece of ground 50 acres in extent. Explain how this is to be fenced with wire and larch posts, describing how the straining and other posts are to be secured in the ground, mentioning the dimensions of the posts, the number and gauge of the wire, and the distances between each wire. State the price of the posts and of the wire, and the cost of erection per yard, and calculate the cost of the total length of fence.

3. Explain when a first thinning should take place in a young plantation of Scots fir and larch which has grown fairly well. When planted the trees were placed $3\frac{1}{2}$ feet apart. Mention the approximate number of trees per acre that would be taken out and the probable number left standing on the ground. When would the next thinning be likely to take place? What value might be expected from each thinning? What would you estimate as the value of the crop if allowed to grow till it was fifty years of age?

4. I am anxious to have a sale of timber, and wish you to explain how to set about it. One plantation, sixty years of age, having a crop of conifers of 300 trees per acre, is to be thinned; and another plantation, containing hardwoods and a general mixture of conifers, is at maturity and must be cleared. Explain how you would mark and classify both divisions, how best to dispose of the trees, what conditions of sale you would draw up, and how you would afterwards treat the ground for replanting.

5. In regard to the conversion of timber, describe briefly (1) the details of a simple saw-mill, (2) the motive power required to suit varying circumstances, (3) the mode of transport of timber to and from the saw-mill, (4) the seasoning of timber by (a) natural and (b) artificial means.

6. State what are the causes and effects of defects in timber such as ring-shake, star-shake, heart-rot, red-rot, blue-wood, and loose and black knots.

7. State what you consider should be the normal weight of timber in the green state and air-dried, (1) Conifers, (2) Hardwoods, and (3) Softwoods, such as willow, poplar, lime, &c.

(Two hours allowed.)

FOREST BOTANY AND FOREST ENTOMOLOGY.

(Candidates are expected to answer five of the questions—three from the Section of Forest Botany, and two from the Section of Forest Entomology.)

(A) FOREST BOTANY.

1. Describe leaf-fall. What is the advantage to the plant of the process?

2. Write an account of the life-history of any parasitic fungus harmful to a forest-tree. What methods of prevention and of remedy would you adopt in relation to the fungus you describe?

3. Describe the seed of oak, ash, elm, larch, maple, elder, hawthorn. What do you know of the duration of vitality and of the length of period of germination of these seeds?

4. What is the structure and function of a medullary ray? Describe the condition of a medullary ray in winter and in summer.

5. Describe the mechanism for pollination in the flowers of any three forest trees of different genera.

(B) FOREST ENTOMOLOGY.

6. Describe *Hylobius abietis*, the Pine Weevil, under the following heads:—

- (a) The weevil itself and how it is recognised.
- (b) Its life-history.
- (c) What plants are attacked, when, and how?
- (d) Preventive and remedial measures.

7. Give a detailed year's life of the Spruce Gall Aphis or the Woolly Aphis, noting the direct and indirect harm done to the tree attacked, and measures of prevention and remedy.

8. Name two Lepidopterous, or two Hymenopterous, caterpillars destructive to forest trees. How would you—

- (a) Recognise them?
- (b) Recognise their work?
- (c) Fight them?

(Two hours allowed.)

PHYSICS, CHEMISTRY, METEOROLOGY.

1. How would you determine the specific gravity of a piece of stone and a piece of wood respectively?

2. Given a piece of wood, a piece of limestone, and some water, how from these would you make caustic potash?

3. What are the chief products obtained from the destructive distillation of wood? How would you make pure acetic acid from them?

4. Describe the construction of the mercurial barometer, and explain what is directly, and also inferentially, indicated by a fall in the mercurial column.

(An hour and a half allowed.)

LAND MEASURING, &c.

1. Calculate the contents of an area of ground, the two sides of which are parallel and measure 600 and 450 feet respectively, the uniform breadth being 180 feet, and give the result: 1st, in square yards; 2nd, in Imperial measure—acres, roods, and poles; and 3rd, in Scots measure—acres, poles, and fells.

2. Calculate the contents of a triangular piece of land measuring 300 feet along the base and 160 feet perpendicular from the base to the apex, in square yards.

3. Calculate the contents of a circle measuring 3 chains radius, and give the result in acres, roods, and poles.

4. Calculate the contents of a piece of earth-cutting for the formation of a roadway 30 feet wide, measuring 300 feet in length, 12 feet in depth at one end and 6 feet in depth at the other end, and to have side slopes of $1\frac{1}{2}$ horizontal to 1 perpendicular, in cubic yards.

5. What are the points to be attended to in the proper construction of an estate road 18 feet wide?

6. Give sketch of a bridge to be constructed of estate material over a burn for the above road.

7. State the various forms of wheel for utilising water-power for driving the machinery of a saw-mill, and which gives the most power.

(Two hours allowed.)

ARITHMETIC AND BOOK-KEEPING.

1. Simplify $(\frac{1}{2} \text{ of } 3\frac{1}{2}) + (\frac{3}{4} \div \frac{5}{8}) - (\frac{1}{1\frac{1}{2}} - \frac{1\frac{1}{2}}{3}) \div (2 - \frac{5}{8})$.

2. Find by Practice the rent of 23 acres 3 roods 5 poles, at £3, 18s. 9d. per acre.

3. Express 3 roods 27 poles 11 yards in decimals of an acre.

4. If the carriage of 3 tons of timber cost £5 for 40 miles, how much ought to be carried for the same price for 25½ miles? Give the answer in decimals of a ton correct to 2 places.

5. Find the weight of a rectangular pile of larch boards 7 feet high 15 yards long and 4 yards wide, assuming that the boards weigh 40 lbs. per cubic foot. The pile consists of 6048 boards 12 feet long by 10 inches wide. Of what thickness are these boards?

6. Give a specimen page of the Private Sales Book which you would advise a forester on a large estate to keep.

7. The following is a statement of the cash transactions of William Thomson, forester on the Widemoor Estate, for the month of May 1902. Prepare therefrom a branched statement of Receipts and Expenditure, bringing out the balance of cash on hand at 31st May 1902. There was a balance of £35 due to the forester at 30th April :—

1902.

May	1.	Received price of 500 larch trees sold by public auction	£260	0	0
"	"	Paid Wm. Thomson, salary for quarter	50	0	0
"	"	" County Assessments	115	0	0
"	2.	" W. Gunn, for young trees for nursery	80	0	0
"	"	" Great Northern Railway Co., carriage of do.	5	0	0
"	"	Received from John Ross, price of 120 dozen paling rails sold to him by private contract	15	0	0
"	3.	Paid W. Jackson, assistant forester, salary for quarter	20	0	0
"	4.	Received from John Wallace, price of 700 small oaks sold him by private contract	35	0	0
"	"	Paid R. Haig, for young trees for nursery	50	0	0
"	"	" W. Black, carter, carriage of do.	4	0	0
"	5.	Received price of 2000 Scots pine trees sold by public auction	650	0	0
"	10.	Received from T. Wilson, price of 40 Scots pine trees sold to him by private contract	14	0	0
"	12.	Paid G. Goodman, for advertising sale of timber	3	0	0
"	13.	" T. Young, for saws supplied by him	18	0	0
"	14.	" Auctioneer, commission on sales in April	50	0	0
"	18.	Received price of 2500 larch trees sold by public auction	1200	0	0
"	19.	Paid A. Jarvie, implement maker	50	0	0
"	20.	" Fire Insurance Premium for Lodge, due 15th inst.	2	0	0
"	24.	Received from R. Hood, price of 25 tons firewood sold to him by private contract	10	0	0
"	27.	Paid J. Inkman, for printing catalogues	5	0	0
"	29.	" C. Smith, blacksmith	15	0	0
"	31.	" Wages for month, as per list	1150	0	0

(An hour and a half allowed.)

DAIRY DEPARTMENT

EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

This Examination, instituted in 1897, is conducted by the National Agricultural Examination Board, appointed jointly by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland.

REGULATIONS.

1. The Societies may hold annually in England and in Scotland, under the management of the National Agricultural Examination Board appointed by them, one or more Examinations for the National Diploma in the Science and Practice of Dairying; the Diploma to be distinguished shortly by the letters "N.D.D."

2. The Examinations will be held on dates and at places from time to time appointed and duly announced.

3. A deposit of £1 will be required from each candidate, which deposit will be returned only to those candidates who succeed in obtaining the Diploma at the first attempt. The Board may, at their discretion, allow an unsuccessful candidate to sit for one subsequent Examination without payment of a further deposit.

4. Forms of Entry for the Examination in England may be obtained from the Secretary of the Royal Agricultural Society of England, 13 Hanover Square, London, W., and must be returned to him duly filled up, with the deposit of £1, on or before 31st August.

5. Forms of Entry for the Examination in Scotland may be obtained from the Secretary of the Highland and Agricultural Society of Scotland, 3 George IV. Bridge, Edinburgh, and must be returned to him duly filled up, with the deposit of £1, on or before 31st August.

6. A candidate may enter for the Examination either in England or Scotland, but not in both; and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versa*. No candidate may sit for the Examination more than twice.

7. A candidate will be required to satisfy the Examiners, by means of written papers, practical work, and *visd voce*, that he or she has —

- (1) A general knowledge of the management of a Dairy Farm, including the rearing and feeding of Dairy Stock, the candidate being required to satisfy the examiners that he or she has had a thorough training and practical experience in all the details of Dairy work as pursued on a farm.
- (2) A thorough acquaintance, both practical and scientific, with everything connected with the management of a Dairy, and the manufacture of Butter and Cheese.
- (3) Practical skill in Dairying, to be tested by the making of Butter and Cheese.
- (4) Capacity for imparting instruction to others.

8. The Board reserve the right to postpone, to abandon, or in any way, or at any time, to modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

By ORDER,

ERNEST CLARKE,

Secretary, Royal Agricultural Society of England,
13 HANOVER SQUARE, LONDON, W.

JAMES MACDONALD,

Secretary, Highland and Agricultural Society of Scotland,
3 GEORGE IV. BRIDGE, EDINBURGH.

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—GENERAL MANAGEMENT OF A DAIRY FARM.

1. *General Management of Pastures and Crops on a Dairy Farm.*
2. *Buildings.*—Situation, Surroundings, Construction, Ventilation, and Drainage of Farm Buildings. Suitability of building materials. Water supply. Construction and arrangements of Dairies: (a) for General Purposes; (b) for Special Purposes.
3. *Foods and Feeding.*—Summer and Winter Feeding of Dairy Cattle. Root crops. Green fodder. Ensilage. Different kinds of food and their composition. Their effect upon Milk, Butter, and Cheese. Special Foods used in Dairy Feeding. Preparation of food for Dairy Stock. Rearing and feeding of young Stock. Feeding and management of Pigs and Poultry.
4. *Dairy Cattle in Health and Disease.*—Characteristics of different Breeds, and choice of Dairy Cattle. General functions of the organs of the animal body. Breeding. Parturition. Organs which secrete milk. Process of milk secretion. Changes which food undergoes during digestion. Diseases of Dairy Cattle and their remedies.

II.—MANAGEMENT OF A DAIRY.

1. *Milk and Cream.*—Process of Milking. Dairy Utensils and Appliances, hand and power. Cooling of Milk. Separation and ripening of Cream. Different systems of Cream-raising. Utilisation of Skim-milk. Keeping of Milk. Importance of Cleanliness. Diseases spread by Milk. Conveyance and sale of Milk. Milk records. Keeping of Dairy and Farm Accounts. Creameries. Butter and Cheese Factories. Different systems of Dairying and their comparative returns.
2. *Butter.*—Churns and other Butter-making appliances, hand and power. Souring of Cream. Churning. Washing and working of Butter. Butter-milk. Packing and transmission of Butter. Salting and keeping of Butter. Colouring. Characteristics of good Butter.
3. *Cheese.*—Principles of its manufacture. Making of different kinds of Cheese (from cream, whole-milk, and skim-milk). Acidity of Milk. Use of Rennet and its substitutes. Whey. Appliances for Cheese-making. Ripening and storage of Cheese. Packing and sale of Cheese. Making of Cream and other soft Cheeses.

III.—CHEMISTRY AND BACTERIOLOGY.

[*N.B.*—In this Section there will be expected of the candidate a sound understanding of the scientific principles underlying the practice of Dairying, a knowledge of the composition, nature, properties, and changes undergone by the different substances met with in Dairying, and a general acquaintance with the principles of laboratory methods so far as Dairying is concerned.]

1. *General Principles of Chemistry.*—The nature of elements and compound bodies. The different forms of matter—solid, liquid, gaseous. Specific gravity, and instruments for determining it. Temperature, and methods of measuring it. Thermometric scales. The influence of temperature in Dairy operations. Physical and chemical changes involved in the following: solution, precipitation, filtration, distillation, oxidation, and reduction. Acids, Bases, Salts—their distinctive properties. Acidity and Alkalinity—their influence and quantitative estimation.

The Atmosphere—its constituents and impurities; its influence on Dairy operations. Atmospheric pressure.

Water—constituents of pure and natural waters. The impurities of water and whence derived. The importance of a pure water-supply in Dairying.

General knowledge of the elementary chemistry of the following substances and their compounds so far as met with in Dairying: Potash, Soda, Ammonia, Lime, Phosphoric Acid, Alcohol, Acetic Acid, Carbonic Acid, Butyric Acid, Lactic Acid, Albumen, Casein, Fats, Milk-sugar, Glycerine, Pepsin.

Saponification of Fats.

2. *Milk and its Products.*—The nature, composition, properties, and chemical constituents of milk. Microscopical appearances presented by milk. The circumstances that affect the quality and quantity of milk produced by the cow. The influence of feeding. The changes which occur in the keeping of milk, and how produced. The natural and artificial souring of milk. Rennet, its nature and use. Physical and chemical changes involved in the making and keeping of Butter, and in the manufacture and ripening of Cheese. Separated Milk, Condensed Milk, Fermented Milk. The use of Preservatives. Methods of Milk-testing—Mechanical methods, their theory and practice. A general knowledge of the methods employed in the chemical analysis of Milk and Butter. Adulteration of Milk, Cream, Butter, and Cheese—the ways in which adulteration is practised, the changes in composition thereby produced, and a general knowledge of the methods employed in detecting the same.

3. *The Chemistry of Feeding.*—The principal constituents of Food materials, and the functions they severally fulfil. The influence of Food constituents on milk production. Assimilation and Digestion. Animal Heat and Respiration. Milk as a Food. The relation of Food to Manure.

4. *Bacteriology.*—Moulds. Yeasts. Bacteria. The principal kinds of Bacteria met with in Dairying—their forms, methods of reproduction, and conditions of life. The influence of physical agencies upon Bacterial life. Air and Water as carriers of Bacteria. The changes produced by Bacteria in milk and its products. Useful forms and their functions. Harmful forms and their effects—Coagulation, Discoloration, Taints, &c. Pathogenic organisms. The classification of organisms—organised ferments and enzymes. Methods of preparation of pure cultures and their

practical use. Nutritive media. Pasteurisation and Sterilisation—the practical application of these to Dairy matters. Fermentation and Putrefaction. Disinfectants and Preservatives.

IV.—PRACTICAL SKILL IN DAIRY WORK.

Candidates must be prepared—(1) to produce at or before the Examination a satisfactory certificate of proficiency in the Milking of Cows, signed by a practical Dairy Farmer, and to satisfy the Examiners by a practical test, if so required; (2) to churn and make into Butter a measured quantity of Cream; and (3) to make one Cheese of each of the following varieties: (i) Hard-pressed, of not less than 30 lb.; (ii) Veined or blue-moulded, of not less than 10 lb.; and (iii) also to make one or other of the following Soft Cheeses: Camembert, Coulommier, or Pont l'Évêque.

V.—CAPACITY FOR IMPARTING INSTRUCTION TO OTHERS.

Candidates must also show practically that they are familiar with the management of a Dairy, and are capable of imparting instruction to others.

EXAMINATIONS IN 1904.

ENGLAND—MONDAY, September 19, and following days, at the Reading College and British Dairy Institute, Reading; last date for receiving applications, 31st August.

SCOTLAND—MONDAY, September 26, and following days, at Kilmar-nock; last date for receiving applications, 31st August.

The following obtained the Diploma in Scotland in 1903:—

ALKER, SAMUEL, County Council Farm, Hutton, near Preston.

CLARKE, FLORENCE ISABEL, May Bank, Milngavie.

FORBES, ROBERT, Kinloss, Forbes, N.B.

HUNTER, JOHN P., Garthland Mains, Stranraer.

LAIDLAW, TIBBIE, 21 Park Circus, Glasgow.

M'INTYRE, KATHERINE C., Balulve Farm, Islay.

STEWART, JAMES GUTHRIE, Deskford, Cullen.

TREES, MRS EDITH, 8 Westminster Gardens, Glasgow.

THOMPSON, WILLIAM B., Far Mountharrow Farm, Ulverston, Lancashire.

M'LEARY, WILLIAM G., Osborne Villa, Lockerbie.

The following obtained the Diploma in England in 1903:—

ALLEN, FREDERICK WILLIAM, Monument Cottage, Wigan Lane, Wigan.

APPLETON, FIFE, British Dairy Institute, Reading.

ELLIS, JOHN, British Dairy Institute, Reading.

FISHER, GEORGE, Harris Institute, Preston.

GARDINER, ETHEL CONSTANCE, 11 Victoria Road, Leicester.

LANGHAM, CATHERINE MABEL, Midland Agricultural and Dairy Institute, Kingston Fields, Derby.

MASON, JEAN MACALISTER, Knight's Farm, 'Olne Engaine, Earl's 'Olne, R.S.O., Essex.

SHAW, CAROLINE, Midland Agricultural and Dairy Institute, Kingston Fields, Derby.

STOCKLEY, WILLIAM THOMAS, Reed's Farm, Rainford, near St Helens, Lancashire.

STRUTHERS, JOHN, British Dairy Institute, Reading.

STUBBS, JESSIE, The Horticultural College, Swanley, Kent.

PAST EXAMINATION PAPERS.

Copies of the Papers set at the Examinations in 1902 and 1903 may be had on application. Price 6d. per set.

CHEMICAL DEPARTMENT

Chemist to the Society—Dr A. P. AITKEN, Chemical Laboratory,
8 Clyde Street, Edinburgh.

The object of the Chemical Department is to promote the diffusion of a knowledge of Chemistry as applied to agriculture among the members of the Society, to carry out experiments for that purpose, to assist members who are engaged in making local experiments requiring the direction or services of a chemist, to direct members in regard to the use of manures and feeding-stuffs, to assist them to put the purchase of these substances under proper control, and in general to consider all matters coming under the Society's notice in connection with the Chemistry of Agriculture.

MEMBERS' PRIVILEGES IN RESPECT OF ANALYSES.

The fees of the Chemist for analyses made for members of the Society shall, until further notice, be as follows :—

The estimation of *one* ingredient in a manure or feeding-stuff, . . . 5s.

The estimation of *two* or *more* ingredients in . . . do. . . 10s.

These charges apply only to analyses made for agricultural purposes, and for the sole and private use of members of the Highland and Agricultural Society who are not engaged in the manufacture or sale of the substances analysed.

Valuations of manures, according to the Society's scale of units, will be supplied if requested.

MISCELLANEOUS.

Analysis of water¹ to determine purity, hardness, and fitness
for domestic use (not more than one analysis per year
for any one member),

£1 0 0

Analysis of agricultural products—hay, grain, ensilage, roots, &c., 1 0 0

Milk, full analysis, 0 10 0

¹ Cases containing bottles for water samples and instructions for sampling are sent from the laboratory on application.

Milk, solids and fat,	0	5	0
" fat only,	0	2	6
Butter, full analysis,	0	10	0
" partial analysis (solids and fat),	0	5	0
Cheese,	0	10	0
Limestone, giving the percentage of lime,	0	5	0
Limestone, complete analysis,	1	0	0
Analysis of soil, to determine fertility and recommendation of manurial treatment,	1	10	0
Complete analysis of soil,	2	10	0
Search for poisons in food or viscera,	2	0	0

Samples should be sent (carriage paid) to Dr A. P. Aitken, 8 Clyde Street, Edinburgh.

INSTRUCTIONS FOR SELECTING SAMPLES FOR ANALYSIS.

MANURES.

Any method of sampling mutually agreed upon between buyer and seller may be adopted, but the following method is recommended as a very complete and satisfactory one: Four or more bags should be selected for sampling. Each bag is to be emptied out separately on a clean floor, worked through with the spade, and one spadeful taken out and set aside. The four or more spadefuls thus set aside are to be mixed together until a uniform mixture is obtained. Of this mixture one spadeful is to be taken, spread on paper, and still more thoroughly mixed, any lumps which it may contain being broken down with the hand. Of this mixture two samples of about half a pound each should be taken by the purchaser or his agent, in the presence of the seller or his agent or two witnesses (due notice having been given to the seller of the time and place of sampling), and these samples should be taken as quickly as possible, and put into bottles or tin cases to prevent loss of moisture, and having been labelled, should be sealed by the samplers—one or more samples to be retained by the purchaser, and one to be sent to the chemist for analysis.

FEEDING-STUFFS.

Samples of feeding compounds may be taken in a similar manner.

Samples of cake should be taken by selecting three cakes, breaking each across the middle, and from the broken part breaking off a segment across the entire breadth of the cake. The three segments thus obtained should be wrapped up and sealed by the samplers, and sent for analysis as in the case of manures, and three duplicate segments similarly sealed and labelled should be retained by the purchaser.

SOILS.

Dig a little trench about two feet deep, exposing the soil and subsoil. Cut from the side of this trench vertical scrapings of the soil down to the top of the subsoil. Catch these on a clean board, and collect in this manner two pounds of soil taken from the whole surface of the section. Similar scrapings of subsoil immediately below should be taken and preserved separately. Five or six similarly drawn samples at least should be taken from different parts of the field, and kept separate while being sent to the chemist, that he may examine them individually before mixing in the laboratory.

VEGETABLE PRODUCTS.

Turnips, &c., 20 to 40 bulbs carefully selected as of fair average growth. *Hay, straw, ensilage, &c.*, should be sampled from a thin section cut across the whole stack or silo, and carefully mixed about; above 2 lb. weight is required for analysis. *Grain* should be sampled like manures.

DAIRY PRODUCE.

Milk.—Samples of milk from individual cows should be taken direct from the milk-pail after complete milking. Average samples from a number of cows should be taken immediately after milking. Specify whether the sample is morning or evening milk, or a mixture of these in equal parts. Samples to be tested for adulteration should not be drawn from the bottom or taken from the top of standing milk, but they should be ladled from the vessel after the milk has been thoroughly mixed.

For most purposes a pint bottle of milk is a large enough sample.

Butter and Cheese.—About quarter-pound samples are required.

WATERS.

When the water is from a well, it should be pumped for some minutes before taking the sample.

If the well has been standing unused for a long time, it should be pumped for some hours, so that the water may be renewed as far as possible.

If the well has been newly dug or cleaned out, it should be pumped as dry as possible, daily, for a week before taking the sample.

Water from cisterns, tanks, ponds, &c., should be sampled by immersing the bottle entirely under the water, and holding it, neck upwards, some inches below the surface. *Water from the surface should not be allowed to enter the bottle.*

Spring or stream water should not be sampled in very wet weather, but when the water is in ordinary condition. Such waters should be sampled by immersing the bottle, if possible; but if not deep enough for that purpose, a perfectly clean cup should be used for transferring the water to the bottle.

When the bottle has been filled the stopper should be rinsed in the water before replacing it.

Interference with or disturbance of wells or springs, or the ground in their immediate vicinity, must be carefully avoided during sampling, and for at least twenty-four hours before it.

After a sample has been taken, it should be sent to the laboratory as speedily as possible.

A description of the source and circumstances of the water should accompany the sample, as the interpretation of the analytical results depends to some extent on a knowledge of such particulars.

N.B.—Stone jars and old wine bottles are unsuitable for conveying samples. Winchester quarts chemically cleaned should be obtained from the laboratory here.

LOCAL ANALYTICAL ASSOCIATIONS.

With the view of encouraging, as well as regulating the conduct of, Local Analytical Associations, the Society, from 1881 to 1893, contributed from its funds towards their expenses a sum not exceeding £250 annually.

In view of the passing of the Fertilisers and Feeding Stuffs Act, 1893, it was decided, at a meeting of the Directors on the 6th of December 1893, to discontinue that grant after the 1st of March 1894.

COMPOSITION AND CHARACTERISTICS OF MANURES AND FEEDING-STUFFS.

(See 'Transactions,' Fifth Series, vol. xi. 1899.)

FORMS OF GUARANTEE

GUARANTEE OF MANURE.

I guarantee that the manure called.....and sold by me to
.....contains a minimum of—

Soluble phosphoric acid = Phosphate of lime dissolved per cent.
Insoluble phosphoric acid = Phosphate of lime undissolved. per cent.
Potash salts : : = Potash (K_2O) : : : per cent.
Total nitrogen : : = Ammonia : : : per cent.

Date.....19... Signature of seller.....

GUARANTEE OF FEEDING-STUFF.

I guarantee that the feeding-stuff called.....and sold by me to
.....contains a minimum of—

... .. per cent albuminoids.
 per cent oil.
 per cent carbohydrates.

Date.....19... Signature of seller.....

UNITS TO BE USED IN DETERMINING THE COMMERCIAL VALUE OF MANURES.¹

Terms—CASH, including Bags gross weight—not including Carriage.

N.B.—These units are based on the RETAIL PRICES at the following seaports: Berwick, Leith, Bo'ness, Dundee, and Glasgow. When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the cash price at which TWO TONS may be bought in fine sowable condition. Larger purchases may be made on more favourable terms, but for smaller purchases an extra charge of 1s. 6d. per ton is made.

FOR SEASON 1904.

CASH PRICES AS FIXED ON 3RD FEBRUARY.

Items to be Valued.	Peruvian (Riddled).		Bone-Meal.	Steamed Bone Flour.	Dissolved or Vitrified Bones.	Superphosphates.
	Ammoniacal.	Phosphatic.				
	P. unit.	P. unit.	P. unit.	P. unit.	P. unit.	P. unit.
Phosphates dissolved . . .	1/4	1/3	{ ..	{ ..	2/7	1/9½
" undissolved . . .			{ 1/4	{ 1/4	1/4	..
Potash	3/6	3/6	..	..	..	..
Nitrogen	15/9	15/-	12/1	12/1	14/6	..
or Ammonia	13/-	12/6	10/-	10/-	12/-	..
Prices per ton, Feb. 3, 1904—						
From	{ 150/ up-	{ 105/ up-	105/-	95/-	105/-	45/-
To	wards	wards	115/-	105/-	110/-	65/-

MANURES.

	Guarantee.	Price per Ton.	Unit.
	Per cent.	£ s. d.	
Sulphate of ammonia ² . . ex works	24 Ammonia	13 0 0	Am. = 10/10
Nitrate of soda, 95 per cent ² ex ship	19 "	9 15 0	" = 10/3
Muriate of potash, 80 per cent "	50 Potash	8 15 0	Pot. = 3/6
Sulphate of potash, 80 per } cent, or over }	..	..	" = 3/9
Kainit "	13 Potash	2 0 0	" = 3/4
Potash salts	26 "	4 10 0	" = 3/5
Thomas-slag phosphate at place of production }	30 Phosphate	1 15 0	Phos. = 1/2
" "	38 "	2 0 0	" = 1/-

¹ Instructions regarding units and the valuation of manures are given on p. 84.

² These are the February prices, but they are subject to variation from month to month or oftener.

FLADING-STU119.				Price per Ton in bags
	Average Analyses.			
	Album.	Oil.	Carbo- hydrates.	
Linseed-cake	28	9	35	£ s. d. 7 0 0
" Canadian or American . .	30	7	35	6 10 0
Decorticated cotton-cake . . .	45	10	20	6 15 0
" " Seed-meal . . . . .	..	..	..	6 12 6
Undecorticated " (Home) . .	24	7	25	4 15 0
" " (Bombay). . . . .	.	.	.	4 10 0
Bean-meal ¹	25	2	50	6 15 0
Rice meal	11	10	50	4 2 6
Locust-bean meal	6	2	70	5 10 0
Dried Distillery grains	20	8	50	5 10 0
" Brewery "	20	8	50	4 15 0
Barley-bran	15	5	50	4 15 0
Indian corn ¹	10	5	55	5 5 0
Maize-germ meal . . . . .	..	.	..	5 10 0
Paisley meal	15	9	60	5 0 0
Linseed (whole)	20	25	14	11 10 0
Linseed-oil . . . . .	.	.	.	19 0 0
Treacle . . . . .	..	..	..	4 2 6

¹ These are the February prices, but they are subject to variation from month to month or oftener.

CLASSIFICATION OF MANURES.

Bone-meal	Genuine bone-meal contains from 48 per cent to 55 per cent phosphates, and from 1 per cent to 5 per cent ammonia. If phosphates are low, ammonia will be high, and conversely.
Steamed bone-flour	Ground to flour and containing about 60 to 65 per cent phosphates, and about 1 to 2½ per cent ammonia.
Dissolved bones	{ Must be pure—i.e., containing nothing but natural bones and sulphuric acid.
Mixtures and compound manures	{ To be valued according to the unit values (as given above) of the ingredients of which they are guaranteed and also found to be composed, with an addition of 7s. 6d. per ton for mixing.
Thomas-slag .	{ High-class compound manures to be valued at the mean between the highest and lowest units applicable to each ingredient.
	{ Fineness of grinding is of paramount importance. The coarsest kind used should be so finely ground that at least 75 per cent passes through a sieve of 10,000 holes per sq. inch.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take muriate of potash—a good sample (see p. 33) will be guaranteed to contain 80 per cent *pure* muriate of potash; the other 20 per cent consisting of unimportant impurities such as common salt. But all potash manures are valued according to the amount of Potash they yield, and 80 per cent of pure muriate of potash yields 50 per cent

potash (K_2O)—i.e., 50 units per ton, and as a ton of muriate of potash costs £8, 15s. the price of the unit is the fiftieth part of that—viz., 3s. 6d. If on analysis a sample of muriate of potash guaranteed to contain 50 per cent of potash is found to contain only 49 per cent, the price per ton will be 3s. 6d. less—viz., £8, 11s. 6d.

Similarly with all other manures the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and therefore the proper price per ton of a manure is found by multiplying the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

Nitrate of soda contains no ammonia but it contains nitrogen, and 14 units of nitrogen are equivalent to 17 units of ammonia, and it is the custom in Scotland to value all nitrogenous manures not according to the nitrogen they contain but according to its equivalent of ammonia.

The commercial values of manures are determined by means of the Units in the following manner:—

Take the analysis of the manure, and look for the following substances:—

Phosphates dissolved (or soluble phosphate)	} No other items but these are to be valued.
" undissolved (or insoluble "	
Nitrogen = Ammonia	
Potash	

Should the analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is bone-meal:—

An ordinary bone-meal will contain about 50 per cent phosphate and nearly 4 per cent ammonia. The units for bone-meal are 1s. 4d. for phosphate and 10s. for ammonia. Therefore the value is—

Insol. phosphate, 50 times 1s. 4d., equal to £3 6 8
 Nitrogen = Ammonia, $4\frac{1}{2}$ times 10s., equal to 2 5 0

Say £5 11 8 per ton.

Suppose the manure is dissolved or vitriolated bones:—

It must be guaranteed "pure."

The units in the Schedule are 2s. 7d. for soluble phosphate, 1s. 4d. for insoluble phosphate, and 12s. for ammonia.

The analysis will be about 16 per cent soluble phosphate, 20 per cent insoluble phosphate, and $3\frac{1}{2}$ per cent ammonia. In that case the value would be—

Sol. phosphate, 16 times 2s. 7d., equal to £2 1 4
 Insol. " 20 " 1s. 4d., " 1 6 8
 Nitrogen = Ammonia, $3\frac{1}{2}$ " 12s., " 2 2 0

Say £5 10 0 per ton.

Suppose the manure is a superphosphate,—say an ordinary superphosphate, with 28 per cent soluble phosphate and 3 per cent insoluble phosphate. It is valued thus:—

Sol. phosphate, 28 times 1s. 9½d., equal to, say, £2, 10s. 3d. per ton.
Insoluble phosphate is not valued in a superphosphate.

Note.—The units have reference solely to the COMMERCIAL VALUES of Manures, and not to their AGRICULTURAL VALUES.

Thus, in stating soluble phosphate in dissolved bones at 2s. 7d. per unit, and that in superphosphate at 1s. 9½d., it is meant that these are the prices per unit at which soluble phosphate can be bought in these two manures; but it does not mean that the soluble phosphate in the one is 9½d. per unit better as a manure than that in the other. It is probably no better.

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—A. N. M'ALPINE,
6 Blythswood Square, Glasgow.

The Society have fixed the following rates of charge for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination they require, and to quote its number in the subjoined schedule. The charge for examination must be paid at the time of application, and the carriage of all parcels must be prepaid.

Scale of Charges.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed, 1s.
2. Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention, 1s.
3. Report on any disease affecting farm crops, 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value, 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seed he buys, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broom-rape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The Sampling of Seeds.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified.

Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100; thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83.6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants must be in flower or fruit. They should be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They should be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

Parcels or letters containing seeds or plants for examination (carriage or postage paid) must be addressed to Professor M'Alpine, Botanical Laboratory, 6 Blythswood Square, Glasgow.

INSECT PESTS.

Arrangements have been made with Mr R. Stewart MacDougall, M.A., D.Sc., Edinburgh, to advise members of the Society regarding insects or allied animals which, in any stage of their development, infest—

- | | |
|-----------------------------------|-------------------------------------|
| (a) Farm crops. | (d) Fruit and fruit trees. |
| (b) Stored grain. | (e) Forest trees and stored timber. |
| (c) Garden and greenhouse plants. | (f) Live stock (including poultry). |

Members consulting Dr MacDougall will please forward with their queries examples of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or other animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, to prevent injury in transmission.

Address letters and parcels (carriage or postage paid) to Dr R. Stewart MacDougall, 13 Archibald Place, Edinburgh.

The Directors have fixed the fee payable by members to Dr MacDougall at 1s. for each case upon which he is consulted; this fee must be sent to him along with the application for information.

PREMIUMS

GENERAL REGULATIONS FOR COMPETITORS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions.'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, nor circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject not included in the Premium List; and if the topic and the treatment of it are both approved, the writer may be remunerated and his paper published.

CLASS I.

REPORTS.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purposes chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty acres of Waste Land—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land

—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November in any year.

The Reports in competition for Nos. 3, 4, and 5 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return and a certified measurement of the ground are requisite.*

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten Sovereigns. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES AND FISHERIES.

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Sovereigns. To be lodged by 1st November 1904.

SECTION 4.—MACHINERY.

FOR APPROVED REPORTS.

To be lodged by 1st November in any year.

SECTION 5.—FORESTRY DEPARTMENT.

FOR APPROVED REPORTS.

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Sovereigns. To be lodged by 1st November 1904.

The premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

CLASS II.

DISTRICT COMPETITIONS.

REGULATIONS 1904.

As to payment of Grants, see Regulation 10, Section 1.

Grants in aid of DISTRICT COMPETITIONS for 1905 must be applied for before 1st November 1904, on Forms to be obtained from the Secretary.

When a Grant has expired, the District cannot apply again for aid for two years.

SECTION I.—GRANTS TO DISTRICT SOCIETIES FOR HORSES, CATTLE, SHEEP, AND PIGS.

1. CLASS OF STOCK—LIMIT OF GRANTS, £340.—The Highland and Agricultural Society will make Grants to District Societies to deal with, as in the opinion of the District Societies the need of each district may require, for such classes of Stock of Horses, Cattle, Sheep, and Pigs as are embraced in the General Show Prize List of the Highland and Agricultural Society. The total sum to be expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £340 in any one year.

2. GRANT TO DISTRICT, £12.—The portion of the Grant to any one District Society shall not exceed the sum of £12 in any one year.

3. CONTINUANCE OF GRANT THREE YEARS—ADVERTISING.—The Grant shall continue for three alternate years, provided always that the District

Society shall, in the two intermediate years, continue the competition by offering Premiums equal in amount to not less than one-half the sum given by the Highland and Agricultural Society, and for the same class of Stock as that selected in each previous year to compete for the Highland and Agricultural Society's Prizes. The Prizes when given by the Highland and Agricultural Society must be announced as the Society's gift. If no competition takes place for two years the Grant expires.

4. When it is agreed to hold the General Show of the Society in any district, no provincial show shall be held in that district in the months of June, July, or August.

5. MEDALS.—In the two alternate years the Highland and Agricultural Society will place three Silver Medals at the disposal of the District Societies, for the same classes of Stock as those for which the Money Premiums are offered, provided that not less than three lots are exhibited in the same class.

6. RULES OF COMPETITION.—The Rules of Competition for the Premiums, the Funds for which are derived from Grants of the Highland and Agricultural Society, shall be such as are generally enforced by the Society receiving the Grant for Premiums offered by itself.

7. AREA AND PARISHES.—FIVE PARISHES.—When making application for Grants from the Highland and Agricultural Society, the District Society must delineate the area and the number of parishes comprised in the district, and, *except in special cases*, no District Society shall be entitled to a Grant whose show is not open to at least five Parishes.

8. NOMINATION OF MEMBERS.—The Directors may nominate one or more members of the Highland and Agricultural Society resident in the district, whose duty it shall be to see that the conditions imposed by the Board are complied with.

9. REPORTS.—Blank Reports will be furnished to the Secretaries of the different District Societies. These Reports must in all details be completed and lodged with the Secretary of the Highland and Agricultural Society on or before the 1st of November next following the competition, both in the years when the Grant is given and in the two intermediate years, for the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All such Reports must be signed and certified by the Members of the Highland and Agricultural Society nominated under Rule 8.

10. GRANTS—WHEN PAID.—The Grants made to District Societies will be paid as soon as practicable after the Reports of the awards of the prizes have been received and found to be in order and passed by the Board of Directors, the Money Grants being paid to the Secretaries of the Local Societies and the Medals sent direct to the winners. The Secretary of the District Society must not on any condition whatever pay any premium offered by the Highland and Agricultural Society until he has been informed that the awards are in order and has received the grant from the Highland and Agricultural Society.

11. RENEWAL OF APPLICATION.—No application for renewal of a Grant to a District Society will be entertained until the expiration of *two years* from the termination of the last Grant.

12. DISPOSAL OF APPLICATIONS.—In disposing of applications for District Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those District Societies which have been longest off the list.

13. DAIRY PRODUCE.—Upon application being made by District Societies, a limited number of Medals will be placed at the disposal of District Societies for Dairy Produce.

DISTRICTS.

1. BREADALBANE.—*Convener*, Thomas Watters, Glenample, Lochearnhead; *Secretary*, Peter Buchanan, Solicitor, Callander. Granted 1898. (In abeyance in 1900 on account of the Stirling Show. Omitted to award the Medals in 1902. Will receive £12 in 1903, and Medals in 1904.)
2. STIRLING.—*Convener*, J. T. M'Laren, Polmaise, Stirling; *Secretary*, Andrew C. Buchanan, 26 Port Street, Stirling. Granted 1899. (In abeyance in 1900 on account of the Stirling Show.)
3. DUNOON.—*Convener*, John Mercer, Ardnadam, Sandbank; *Secretary*, John Dobie, Clydesdale Bank, Dunoon. Granted 1900.
4. GIRVAN.—*Convener*, Gilbert Muiray, Orchardlee, Girvan; *Secretary*, Andrew Dunlop, Royal Bank, Girvan. Granted 1900.
5. EAST KILBRIDE.—*Convener*, John Hamilton, Mains, East Kilbride; *Secretary*, William Strang, 141 West Regent Street, Glasgow. Granted 1900.
6. LOWER WARD OF RENFREWSHIRE.—*Convener*, H. R. D. Peile, Mansion House, Greenock; *Secretary*, Robert Steuart Walker, 11 William Street, Greenock. Granted 1900.
7. WESTER ROSS.—*Convener*, J. B. Peterkin, Mountrich, Dingwall; *Secretary*, Ben. Aird, Banker, Dingwall. Granted 1898. (In abeyance in 1901 on account of the Inverness Show. Held no Show in 1900. Received £12 in 1902, and Medals for Joint Show in 1903.)
8. UNITED EAST LOTHIAN.—*Convener*, William Gillespie, Athelstaneford Mains, Drem; *Secretary*, John Stirling, Solicitor, Haddington. Granted 1902.
9. LOCHABER.—*Convener*, R. E. Jones, Fassifern, Fort William; *Secretary*, N. B. Mackenzie, jun., Estate Office, Fort William. Granted 1902.
10. STRATHENDRICK.—*Convener and Secretary*, W. Watson Murray, Catter House, Drymen. Granted 1902.
11. STRATHBOGIE.—*Convener*, Francis E. Watt, Huntly; *Secretary*, J. G. Stewart, Huntly. Granted 1901. (In abeyance in 1902 on account of the Aberdeen Show.)
12. DUMFRIES.—*Convener*, M. S. M'Kerrow, Boreland of Southwick, Dumfries; *Secretary*, John Blacklock, Solicitor, Dumfries. Granted 1901. (In abeyance in 1903 on account of the Dumfries Show.)
13. INVERNESS-SHIRE.—*Convener*, William M'Bean, 'radlehall, Inverness; *Secretary*, D. Gray, 36 Union Street, Inverness. Granted 1903. (In abeyance in 1903. Grant given to the Joint Show.)
14. KINCARDINESHIRE.—*Convener*, Alex. Milne, Urie Estates Office, Stonehaven; *Secretary*, A. B. Annandale, Stonehaven. Granted 1904.
15. FORTH.—*Convener*, David M'Culloch, The Inn, Forth; *Secretary*, David Veitch, Backshot, Forth. Granted 1904.
16. NEW MONKLAND.—*Convener*, John W. Findlay, 4 Bank Street, Airdrie; *Secretary*, John A. White, Royal Bank, Airdrie. Granted 1904.
17. BLACK ISLE.—*Convener*, Major George G. Munro of Poyntyfield, Balblair, Invergordon; *Secretary*, James M. Fraser, Caledonian Bank, Fortrose. Granted 1904.
18. BUCHLYVIE AND GARTMORE.—*Convener*, James Stirling of Garden, Port of Menteith; *Secretary*, Daniel Fisher, Garehill, Buchlyvie. Granted 1904.
19. MOFFAT AND UPPER ANNANDALE.—*Convener*, William R. Carruthers, Steurieshill, Wamphray, Beattock; *Secretary*, John Young, High

- Street, Moffat. Granted 1900. (In abeyance in 1903 on account of the Dumfries Show.)
20. GLENKENS.—*Convener*, Colonel J. M. Kennedy of Knocknalling, Dalry, Galloway; *Secretary*, James M'Gill, New Galloway. Granted 1900. (In abeyance in 1903 on account of the Dumfries Show.)
 21. CASTLE DOUGLAS.—*Convener*, John M'Kie of Bargally, Ernespie, Castle Douglas; *Secretary*, Malcolm M'L. Harper, British Linen Co. Bank, Castle Douglas. Granted 1902. (In abeyance in 1903 on account of the Dumfries Show.)
 22. ISLAY, JURA, AND COLONSAY.—*Convener*, John Laughton, Ellabus, Islay; *Secretary*, Robert Cullen, Solicitor, Bridgend, Islay. Granted 1901.
 23. ARRAN.—*Convener*, Patrick Murray, Strabane, Brodick; *Secretary*, William Tod, Glenree, Lamlash. Granted 1901.
 24. DOUNE.—*Convener*, John Scrimgeour, Doune Lodge, Doune; *Secretary*, William Gray, Inspector of Poor, Doune. Granted 1901.
 25. FORMARTINE.—*Convener*, George Walker, Tillygreig, Udney, Aberdeen; *Secretary*, James Skinner, Pitmedden, Udney, Aberdeen. Granted 1900. (In abeyance in 1902 on account of the Aberdeen Show.)
 26. DEESIDE UNION.—*Convener*, Lieut.-Col. Innes of Learney, Torphins; *Joint-Secretaries*, John Davidson and John Cooper, Banchory. Granted 1903.
 27. TURRIFF.—*Convener*, James Beaton, Aspen Bank, Turriff; *Secretary*, R. Cruickshank, Claymires, Turriff. Granted 1903.
 28. CARRICK.—*Convener*, Alex. Cross of Knockdon, 19 Hope Street, Glasgow; *Joint-Secretaries*, David Brown and Charles W. Brown, Royal Bank, Maybole. Granted 1903.
 29. CUMNOCK.—*Convener*, Patrick Wardrop, Garlaff, Cumnock; *Secretary*, David Stevenson, Change, Cumnock. Granted 1903.
 30. MARNOCH AND CORNHILL.—*Convener*, James O. Morrison of Culvie, Tippetty, Banff; *Secretary*, Douglas B. Leask, North of Scotland Bank, Aberchirder. Granted 1903.
 31. KIRKINTILLOCH.—*Convener*, Alex. Park, 175 Hope Street, Glasgow; *Secretary*, Andrew Matson, National Bank, Kirkintilloch. Granted 1903.
 - UPPER WARD OF LANARKSHIRE.—*Convener*, James Weir, Sandilands, Lanark; *Secretary*, W. D. Brown, Ferniclea, Lanark. Granted 1903.
 - ARDOCH.—*Convener*, George Nairn, Boreland, Blackford; *Secretary*, William J. Reid, Burnside, Braco. Granted 1903.
 - WEST TEVIOTDALE.—*Convener*, Charles J. Grieve, Brauxholm Park, Hawick; *Secretary*, James Oliver, Thornwood, Hawick. Granted 1903.
 35. EASTERN DISTRICT OF STIRLINGSHIRE.—*Convener*, Charles Brown, Dundas Lodge, Kerse, Grangemouth; *Secretary*, William Wright, Newmarket Street, Falkirk. Granted 1903.
 36. ATHOLL AND WEEM.—*Convener*, John Scott, Eastertyre, Ballinluig, *Secretary*, Hugh Mitchell, Pitlochry. Granted 1900.
 37. PERTHSHIRE.—*Convener*, David Dow, Balmanno, Bridge of Earn; *Secretary*, John F. Smith, Eastfield, Bridge of Earn. Granted 1903.

In 1904.

- Nos. 1, 2, 3, 4, 5, 6, and 7 are in competition for the last year.
 Nos. 8, 9, 10, 11, and 12 are in competition for the second year.
 Nos. 13, 14, 15, 16, 17, and 18 are in competition for the first year.
 Nos. 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, and 35 compete for local Premiums.
 Nos. 36 and 37 are in abeyance on account of the Perth Show.

SECTION 2.—GRANTS TO HORSE ASSOCIATIONS, &c., FOR STALLIONS FOR AGRICULTURAL PURPOSES.

1. HORSES—LIMIT OF GRANT, £210.—The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £210 in any one year.

2. GRANT TO EACH, £15.—The portion of the Grant to any one Horse Association, &c., shall not exceed the sum of £15 in any one year.

3. CONTINUANCE OF GRANT THREE YEARS—INTERMEDIATE YEAR.—The Grant shall continue for three alternate years, provided always that the Horse Association or Society shall, in the two intermediate years, offer at least a sum equal in amount to that granted by the Highland and Agricultural Society for the hire of a Horse in connection with the Association or Society to whom the Grant is made.

4. NOMINATION OF MEMBERS.—The Directors of the Highland and Agricultural Society shall nominate one or more members of the Highland and Agricultural Society, resident in the Districts in which the Society benefited is located, whose duty it shall be to see that the conditions imposed by the Board are complied with.

5. REPORTS—PENALTY FOR NOT ENGAGING HORSE.—No Grant by the Highland and Agricultural Society to Horse Associations, &c., will be paid unless a report, signed and certified by the members appointed under Rule 4, be furnished to the Highland and Agricultural Society not later than the 1st of November in each year in which the Grant is made, and also in the alternate years, stating that a Horse has been engaged by the Horse Association or other Society to whom the Grant is made; and in the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

6. RULES 10 (Time of Payment), 11 (Renewal of Grant), and 12 (Disposal of Applications) applicable to Section 1, shall be applicable to Section 2.

DISTRICTS.

1. NAIRNSHIRE.—*Convener*, Brodie of Brodie, Brodie Castle, Brodie, Foires; *Secretary*, A. J. Mackintosh, St Colms, Auldearn, Nairn. Granted 1900.
2. NEWTON-STEWART HORSE-BREEDING SOCIETY.—*Convener*, William M'Connell, Glasnick, Kirkcowan; *Secretary*, John M'Conchie, Carsewilloch, Creetown. Granted 1900.
3. DEESIDE HORSE-BREEDING ASSOCIATION.—*Convener*, Sir Thomas Burnett of Ley, Bart., Crathes Castle; *Secretary*, John Cooper, Ley, Banchory. Granted 1902.
4. VALE OF ALFORD HORSE-BREEDING SOCIETY.—*Convener*, William A. Mitchell, Auchnagathle, Whitehouse, Aberdeen; *Secretary*, John Reid, Balquharn, Alford, N.B. Granted 1902.
5. CLACKMANNANSHIRE UNION.—*Convener*, J. T. M'Laren, Polmaise, Stirling; *Secretaries*, Norval & Roxburgh, 28 Mar Street, Alloa. Granted 1902.
6. LOCKERBIE ENTIRE HORSE SOCIETY.—*Convener*, Allan Murray, Castle-milk Mill, Lockerbie; *Secretary*, James R. Byers, Solicitor, Lockerbie. Granted 1902.
7. EAST OF FIFE ENTIRE HORSE SOCIETY.—*Convener*, J. Brewster,

- Denburn, Crail; *Secretary*, William Rutherford, Thirdpart, Crail. Granted 1902.
8. WINDYGATES.—*Convener*, John Haig, Cameron House, Windygates; *Secretary*, William Shepherd, Royal Bank, Leven. Granted 1902.
 9. INVERNESS-SHIRE.—*Convener*, J. M. Howe, Castle Heather, Inverness; *Secretary*, D. Gray, 36 Union Street, Inverness. Granted 1902.
 10. PERTH AND COUPAR-ANGUS HORSE IMPROVEMENT SOCIETY.—*Convener*, W. S. Ferguson, Pictstonhill, Perth; *Secretary*, James Stewart, Friarton, Perth. Granted 1902.
 11. INSCH AND GARIOCH HORSE-BREEDING SOCIETY.—*Convener*, Peter Bruce, Myreton, Inch, Aberdeen; *Secretary*, George A. Bruce, Inchfield, Inch, Aberdeen. Granted 1904.
 12. UPPER DONSLIDE.—*Convener*, Alex. Fletcher, Glenbucket Mains, Glenbucket; *Secretary*, John Milne, Town and County Bank, Kildrummy. Granted 1904.
 13. LAMMETMOOR PASTORAL.—*Convener*, George G. Turnbull of Abbey St Bathans, Grant's House; *Secretary*, Thos. Stephenson, Duns. Granted 1904.
 14. UPPER NITHSDALE HORSE SOCIETY.—*Convener*, D. M. MacRae, Stonhouse, Thornhill; *Secretary*, David Paterson, Solicitor, Thornhill. Granted 1904.
 15. POTALLOCH.—*Convener*, R. A. Meikle, Ri-cruin, Lochgilphead; *Secretary*, Arch. Taylor, Ri-cruin, Lochgilphead. Granted 1901.
 16. SPEYSIDE CLYDESDALE HORSE-BREEDING SOCIETY.—*Convener*, Colonel George Smith Grant, Minmore, Glenlivet; *Secretary*, George Anderson, Banker, Craigellachie. Granted 1901.
 17. ATHOLL AND BREADALBANE.—*Convener and Secretary*, James J. Gillespie, St Colmes, Ballinluig. Granted 1901.
 18. GIGHA.—*Convener*, W. J. Yorke Scarlett of Gigha; *Secretary*, W. W. Philip, Estate Office, Gigha. Granted 1903.
 19. CUMBERNAULD, KILSYTH, AND KIRKINTILLOCH.—*Convener*, Alexander Whitelaw of Gartshore, Kirkintilloch; *Secretary*, Alexander Park, 175 Hope Street, Glasgow. Granted 1903.
 20. GATEHOUSE.—*Convener*, D. Y. Veitch, Low Creoch, Gatehouse; *Secretary*, William Crawford, Disdow, Gatehouse. Granted 1903.
 21. SCONE, STRATHORD, AND MURTHLY.—*Convener*, W. S. Ferguson, Pictstonhill, Perth; *Secretary*, James Stewart, Friarton, Perth. Granted 1903.
 22. KELSO DISTRICT CLYDESDALE HORSE SOCIETY.—*Convener*, W. G. Hogarth, Linton Bankhead, Kelso; *Secretary*, A. Riddell, 3 Square, Kelso. Granted 1903.

IN 1904.

Nos. 1 and 2 are in competition for the last year.

Nos. 3, 4, 5, 6, 7, 8, 9, and 10 are in competition for the second year.

Nos. 11, 12, 13, and 14 are in competition for the first year.

Nos. 15, 16, 17, 18, 19, 20, 21, and 22 compete for local premiums.

DAIRY PRODUCE.

Upon application being made by District Societies, a limited number of Silver Medals will be placed at the disposal of District Societies for Dairy Produce.

The Medals are granted for two years, and lapse if not awarded in those years.

SPECIAL GRANTS.

- £40 to the Highland Home Industries Association.—*Joint-Secretaries*, Miss Muriel K. Mackenzie, Canon House, Canon Bridge, Ross-shire, and Miss Jessie D. C. Ross, Riverfield, Inverness. Granted 1895. (Did not hold a Competition in 1899 or 1900.)
- £20 to the Ayrshire Agricultural Association, to be competed for at the Dairy Produce Show at Kilmarnock.—*Convener*, The Hon. G. R. Vernon, Auchans House, Kilmarnock; *Secretary*, John Howie, 58 Alloway Street, Ayr. Granted 1872.
- £5 to Shetland Agricultural Society.—*Convener*, J. M. Goudie, Lerwick; *Secretary*, James J. Brown, Lerwick. Granted 1893.
- £3 to Orkney.—*Convener and Secretary*, James Johnston, Ophir House, Orphir, Orkney. Granted 1883.
- £3 to East Mainland, Orkney.—*Convener*, Alfred Reid, Braebuster, Kirkwall; *Secretary*, John Clouston, Graemeshall, Holm, by Kirkwall. Granted 1898.
- £3 to West Mainland, Orkney.—*Convener*, W. G. T. Watt, Skail House, Stromness; *Secretary*, William A. Ironside, Bankhead, Sandwick, Stromness. Granted 1900.
- £3 to Sanday, Orkney.—*Convener*, W. Cowper Ward, Scar House, Sanday, Orkney; *Secretary*, K. H. Sinclair, Kettletoft, Sanday, Orkney. Granted 1902.
- £3 to Rousay, Orkney.—*Convener*, H. H. Horne, Trumland Farm, Rousay, Orkney; *Secretary*, Alexander Learmonth, Breckon, Rousay. Granted 1903.
- £3 to South Ronaldshay and Burray, Orkney.—*Convener*, Arch. Allan, St Margaret's Hope, Orkney; *Secretary*, Robert Cromarty, Sandwick House, St Margaret's Hope, Orkney. Granted 1904.
- North of Scotland Root, Vegetable, &c.—*Convener*, John Maitland, East Balhalgady, Inverurie; *Secretary*, James Eddie, F.R.H.S., Inverurie. 4 Medals. Granted 1899.
- Kintyre Agricultural Society.—*Secretary*, G. Eiskine Inglis, Campbeltown. £12 and two Medals for 1904 only.

MEDALS IN AID OF PREMIUMS GIVEN BY LOCAL SOCIETIES.

The Society, being anxious to co-operate with local Associations, will give a limited number of Silver Medals annually to Societies, not on the list of Cattle, Horse, or Sheep Premiums, in addition to the Money Premiums awarded in the Districts for—

1. Best Bull, Cow, Heifer of any pure breed, or Ox.
2. Best Stallion, Mare, or Gelding.
3. Best Tup, or Pen of Ewes or Wethers.
4. Best Boar, Sow, or Pig.
5. Best Pens of Poultry.
6. Best Sample of any variety of Wool.
7. Best Sample of any variety of Seeds.
8. Best managed Farm.
9. Best managed Green Crop.
10. Best managed Hay Crop.
11. Best managed Dairy.
12. Best Sweet-Milk Cheese.
13. Best Cured Butter.

14. Best collection of Roots.
15. Best kept Fences.
16. Male Farm Servant who has been longest in the same service, and who has proved himself most efficient in his duties, and to have invariably treated the animals under his charge with kindness.
17. Female Servant in charge of Dairy and Poultry who has been longest in the same service, and who has proved herself most efficient in her duties, and to have invariably treated the animals under her charge with kindness.
18. Best Sheep-Shearer.
19. Most expert Hedge-Cutter.
20. Most expert Labourer at Draining.
21. Most expert Farm Servant at trial of Reaping-Machines.
22. Best Maker of Oat-Cakes.

It is left to the local Society to choose out of the foregoing list the classes for which the Medals are to be competed.

The Medals are granted for two years, and lapse if not awarded in those years.

In 1889 it was resolved that in future no Society shall receive more than two Medals for two years.

Aberdeenshire.

1. ECHT, SKENE, AND MIDMAR.—*Convener*, A. C. Pirie of Dunecht, Aberdeenshire; *Joint Secretaries*, Alex. Ledingham and George Mowat, Dunecht, Echt, Aberdeenshire. 2 Medals. 1904.

Ayrshire.

2. MONKTON, NEWTON, PRESTWICK, AND ST QUIVOX.—*Convener*,
; *Secretary*, Hugh Boyd, jun.,
2 Bute Place, Prestwick. 2 Medals. 1901.

Elginshire.

3. FORRES AND NORTHERN FAT CATTLE CLUB.—*Convener*, R. H. Mackessack, Newton of Struthers, Kinloss, Forres; *Secretary*, Alexander Dunbar, Solicitor, Forres. 2 Medals. 1903.

Fifeshire.

4. CUPAR AND NORTH OF FIFE.—*Convener*, David Reid, Cruivie, Cupar-Fife; *Secretary*, F. W. Christie, Dairsie Mains, Dairsie, R.S.O. 2 Medals. 1903.

Kincardineshire.

5. FETTERCAIRN.—*Convener*, James Milne, Tillytoghills, Fettercairn; *Secretary*, George T. Brown, Cairnbeg, Fordoun. 2 Medals. 1903.

Stewartry of Kirkcudbright.

6. CARSPHAIRN PASTORAL.—*Convener and Secretary*, Charles E. Stewart, Carsphairn, Galloway. 2 Medals. 1903.

Nairnshire.

7. NAIRNSHIRE ORNITHOLOGICAL.—*Convener*, R. B. Falconer, Nairn ; *Secretary*, Thos. R. Ramage, 7 Bath Street, Nairn. 2 Medals. 1904. (Awarded at Christmas Show 1903.)

Perthshire.

8. MOULIN.—*Convener and Secretary*, Robert M'Gillewie, Union Bank, Dunkeld. 1 Medal. 1904.

Renfrewshire.

9. EAGLESHAM.—*Convener*, Andrew Fleming, Threepland, Eaglesham ; *Secretary*, James Lambie, Bonnyton Moor, Eaglesham. 2 Medals. 1903.
10. LOCHWINNOCH.—*Convener*, John Pollock, jun., Springside, Howwood ; *Secretary*, Robert Reid, Writer, Lochwinnoch. 2 Medals. 1904.

Ross-shire.

11. LOCHBROOM.—*Convener*, A. M. MacIntyre, Brae, Dingwall ; *Secretary*, Hay Mackenzie, Banker, Ullapool. 1 Medal. 1904.

Stirlingshire.

12. GARGUNNOCK.—*Convener*, James Paterson, Burnbank, Blairdunmond ; *Secretary*, John Risk, Culmore, Kippen. 2 Medals. 1904.

Applications from other Districts must be lodged with the Secretary of the Society by 1st November next.

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.
2. The classes for which Medals are granted must be in accordance with the list at page 47. The Committee shall select the classes, and specify them in the return.
3. A Committee of Management shall be appointed, and the Convener of the Committee must be a Member of the Highland and Agricultural Society.
4. The Money Premiums given in the District must be not less than £2 for each Medal claimed.
5. The Medal for Sheep-Shearing shall not be awarded unless there are three competitors, and it shall always accompany the highest Money Premium. There must not be fewer than two competitors in all the classes.
6. Blank reports will be furnished to all the Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society on or before the 1st of November next, with the exception of green crop reports, which must be forwarded on or before the 20th of December, for the approval of the Directors, against whose decisions there shall be no appeal.
7. When a grant has expired, the District shall not be eligible to apply again for aid for two years ; and if no competition takes place in a District for two years, the grant shall expire.

PLOUGHING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Ploughing Competitions, provided a Report in the following terms is made to the Secretary, within one month of the Competition, by a Member of the Society :—

FORM OF REPORT.

I, _____ of _____, Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the _____ Association at _____ in the county of _____ on the _____ when _____ ploughs competed; _____ of land were assigned to each, and _____ hours were allowed for the execution of the work. The sum of £ _____ was awarded in the following proportions, viz. :—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society, 3 George IV. Bridge, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match; and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve ploughs in Competition, and not less than Three Pounds awarded in Prizes by the local Society. The Medal to be given to the winner of the first prize.

7. Ploughmen shall not be allowed any assistance, and their work must not be set up nor touched by others; and attention should be given to the firmness and sufficiency of the work below more than to its neatness above the surface.

8. The Local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than ten hours per imperial acre on light land, and fourteen hours on heavy or stony land.

CLASS III.

COTTAGES AND GARDENS.

The following Premiums are offered for Competition in the Parishes after mentioned.

The Premiums are granted for two years.

PREMIUMS FOR BEST KEPT COTTAGES AND GARDENS.

1. Best kept Cottage	.	.	.	.	.	£1	0	0
Second best	.	.	.	.	.	0	10	0
2. Best kept Cottage Garden	.	.	.	.	.	1	0	0
Second best	.	.	.	.	.	0	10	0

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardeners' Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.

3. It is left to the Committee of the District to regulate the maximum annual rent of the Cottages, which may, with the garden, be from £5 to £7.

4. To warrant the award of full Premiums, there must not be fewer than three competitors in each class. If there are less than three competitors in each class, only half Premium will be awarded.

5. A person who has gained the highest Premium cannot compete again.

6. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly; the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

7. In estimating the claims for the Garden Premiums, the judges should have in view—the sufficiency and neatness of the fences and walks; the cleanness of the ground; the quality and choice of the crops; and the general productiveness of the garden.

8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be transmitted by the Conveners to the Secretary *on or before the 1st November next*.

9. When a grant has expired, the District cannot apply again for aid for two years.

Parishes desirous of these Premiums must lodge applications with the Secretary *on or before the 1st November next*.

MEDALS FOR COTTAGES AND GARDENS OR GARDEN PRODUCE AND BEE-KEEPING.

1. The Society will give annually one or two Minor Silver Medals to a limited number of local Associations or individuals, who establish Competitions and Premiums for Cottages, Gardens, Garden Produce, or Bee-Keeping. The Medals will be granted for two years.

2. The Medals may be offered in any two of the following classes, *but under no circumstances will the two Medals be given in one class* :—

- (1) Best kept Cottage or best kept Cottage and Garden.
- (2) Best kept Garden.
- (3) Best Collection of Garden Produce (Flowers excluded).
- (4) Honey.

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £15. The occupiers of Lodges at Gentlemen's Approach Gates, and Gardeners in the employment of others, are not entitled to compete.

4. If Competition takes place for Garden Produce, such produce must be *bona fide* grown in the Exhibitor's Garden. He will not be allowed

to make up a collection from any other Garden. The produce must consist of Vegetables or Vegetables and Fruit—Flowers excluded.

5. The Honey must be the produce of the Exhibitor's own Hives.

6. To warrant the award of a Medal, there must not be fewer than three Competitors.

7. Blank forms for Reports of Competitions will be furnished to the Secretaries of the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society *on or before the 1st November next*, for the approval of the Directors, against whose decisions there shall be no appeal.

8. When a grant has expired, the District cannot apply again for aid for two years, and if no competition takes place in a District for two years the grant expires.

9. Applications for these Medals must be made *before 1st November next*.

Dumfriesshire.

1. KIRKPATRICK - FLEMING. — *Convener*, Charles Hogg, Woodhouse Cottage, Ecclefechan; *Secretary*, David Burnie, Hollee, Ecclefechan. 2 Medals. 1903. (No competition in 1903.)

Berwickshire.

2. BERWICKSHIRE BEE-KEEPERS. — *Convener*, Rev. Macduff Simpson, The Manse, Edrom; *Secretaries*, Robert Craig, Auchencrow Schoolhouse, Reston, and Allan A. Falconer, Duns. 2 Medals. 1903.
3. LAUDERDALE. — *Convener*, George Rankin, Lauder; *Secretary*, Alex. Kelly, jun., Lauder. 2 Medals. 1903.

Edinburghshire.

4. CURRIE BEE-KEEPERS. — *Convener*, D. C. Stewart, The Manse, Currie; *Secretary*, Marshall Bryce, Currie. 2 Medals. 1903.
5. MID-LOTHIAN BEE-KEEPERS. — *Convener*, Rev. J. W. Blake, Temple Manse, Gorebridge; *Secretary*, Wm. Weir, Heriot. 2 Medals. 1903.

Fifeshire.

6. DYBART. — *Convener*, James Orr, 10 Overton Road, Kirkcaldy; *Secretary*, David Rougvie, 24 Aitken Street, Kirkcaldy. 2 Medals. 1904.
7. LESLIE. — *Convener*, Robt. Ritchie, Prinlaws, Leslie; *Secretary*, Andrew Dewar, Croft, Leslie. 2 Medals. 1904.
8. NEWBURGH. — *Convener*, William Guild, Lindores, Parkhill, Newburgh; *Secretary*, William Duncan, 65 High Street, Newburgh. 2 Medals. 1903.
9. PITLESSIE. — *Convener*, Alex. Alison, Cults Mill, Pitlessie; *Secretary*, Rev. A. Forsyth, Pitlessie. 2 Medals. 1903.

Stewartry of Kirkcudbright.

10. URB AND DALBEATTIE. — *Convener*, James Biggar, Chapelton, Dalbeattie; *Secretary*, Q. Aird, Hardgate Schoolhouse, Dalbeattie. 2 Medals. 1904.

Lanarkshire.

11. BIGGAR. — *Convener*, William Foriest, South Back Road, Biggar ; *Secretary*, Wm. A. Low, West End, Biggar. 2 Medals. 1904.
12. CAMBUSLANG HORTICULTURAL SOCIETY. — *Convener*, John Speir, Newton Farm, Newton, Glasgow ; *Secretary*, J. M. Aitchison, 1 Morriston Street, Cambuslang. 2 Medals. 1904.
13. CARNWATH BEE-KEEPERS. — *Convener*, John Robertson, Commercial Bank, Carnwath ; *Secretary*, Geo. C. Murray, Schoolhouse, Carnwath. 2 Medals. 1902. No Competition in 1902.

Perthshire.

14. BREADALBANE, GLENLYON, WEEM, &c. — *Convener*, J. D. Haggart, Laurel Bank, Aberfeldy ; *Secretary*, Angus Macpherson, Belleville, Aberfeldy. 2 Medals. 1903.
15. LOGIEALMOND AND GLENALMOND. — *Convener*, Earl of Mansfield, Scone Palace, Perth ; *Secretary*, John G. M'Laggan, Lethendy Cottage, Glenalmond, Perth. 2 Medals. 1902. (No competition in 1903.)

Renfrewshire.

16. SIR JOHN STIRLING-MAXWELL GARDENS. — *Convener*, Duncan Burns, 160 Kilmarnock Road, Shawlands, Glasgow ; *Secretary*, John R. Bain, 9 Holmhead Place, Cathcart. 2 Medals. 1903.

Ross-shire.

17. NOVAR AND DISTRICT. — *Convener*, R. C. Munro Ferguson of Novar, M.P., Evanton ; *Secretary*, Alex. R. Munro, Newton of Novar, Evanton. 2 Medals. 1904.

Stirlingshire.

18. AIRTH, BOTHKENNAR, CARNOCK, AND DUNMORE. — *Convener*, W. T. Malcolm, Dunmore Home Farm, Larbert ; *Secretary*, Alexander Forbes, Oakfield, Dunmore. 2 Medals. 1903.

FIRST EDITION.]

NOTE.—From 18th till 22nd July all communications should be
addressed to the “Secretary’s Office, Showyard, Perth.”

Address for Telegrams—“**SOCIETY,**” EDINBURGH.

Subject to Orders issued by the Board of Agriculture

HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

GENERAL SHOW OF STOCK AND IMPLEMENTS ON THE SOUTH INCH, PERTH,

ON 19TH, 20TH, 21ST, AND 22ND JULY 1904.

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 16th May.

STOCK, POULTRY, AND DAIRY PRODUCE—Monday, 13th June.

No Entry at ordinary fees taken later than those which are received at the Society’s Office, Edinburgh, by first post, or 10 o’clock, on Monday morning (18th June). Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (15th June), at the Society’s Office, Edinburgh, at 10 o’clock.

COVERED BOOTHS FOR OFFICES—Monday, 13th June.

President of the Society.

THE RIGHT HON. THE EARL OF MANSFIELD.

Chairman of the Board of Directors.

THE RIGHT HON. THE EARL OF MANSFIELD.

Convenor of the Local Committee.

W. S. FERGUSON, ESQ., PICTSTONHILL.

The District connected with the Show comprises the Counties of Perth (Perth Show Division), Forfar (Western Division), Fife, and Kinross.

REGULATIONS.

GENERAL CONDITIONS.

1. The Competition, except where otherwise stated, is open to Exhibitors from all parts of the United Kingdom.
2. Every Lot must be intimated by a Certificate of Entry, lodged with the Secretary *not later than Monday, 16th May, for Implements and other*

Articles, and Monday, 13th June, for Stock, Poultry, and Dairy Produce. No Entry taken at ordinary fees later than those which are received at the Society's Office by first post, or 10 o'clock, on Monday morning, 13th June. Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (15th June), at the Society's Office, Edinburgh, at 10 o'clock. Printed forms of Entry will be issued on application to the Secretary, No. 3 George IV. Bridge, Edinburgh. Admission Orders will be forwarded to Exhibitors, by post, previous to the Show.

Protests. 3. Protests against the awards of the Judges, or against a violation of the judging regulations, must be lodged with the Secretary, at his Office in the Showyard, not later than 9 A.M. on Wednesday, the second day of the Show, and parties must be in attendance at the Secretary's Office, in the Showyard, at 9.30 A.M. that day, when protests will be disposed of. All protests must be accompanied by a deposit of £2, 2s., and if not sustained the sum may be forfeited at the discretion of the Directors. Protests lodged for causes which the protester produces no good evidence to substantiate will render him liable to be reported to the Board of Directors, with the view, if they see reason, of his being prohibited from again entering Stock for a General Show.

Photographing in Showyard. 4. Photographing in the Showyard is not permitted, except by photographers having a Stand in the Showyard or holding a "Photographer's Ticket." The "Photographer's Ticket" may be had from the Secretary, price 15s. It admits the holder to the Show when open to the public, and entitles him to photograph in the Showyard, subject to arrangements made by the Stewards.

Society not liable. 5. The Society shall not be liable for any loss or damage which Stock, Poultry, Dairy Produce, Implements, or other articles may sustain at the Show, or in transit.

Rejecting Entries. 6. The Society reserves the right to reject or cancel any entry or prohibit the exhibition of any entry.

Decisions of Board. 7. The decisions of the Board of Directors are final in all questions respecting Premiums and all other matters connected with the Show, and it shall not be competent for any Exhibitor to appeal against such decisions to, nor seek redress in respect of them from, any other tribunal.

Covered Booths. 8. Covered Booths for Offices (9 feet by 9 feet), purely for business, not for exhibition of goods, can be had for £3, 10s. to Members and £5 to Non-Members. Intimation to be made to the Secretary on or before the 13th of June. Those applying after that date to pay double Entry Money, but no application can be received later than 18th June.

Lights and Smoking. 9. No lights allowed in the Yard at night, and Smoking is strictly prohibited within the Sheds. Those infringing this Rule shall be liable to a fine of 10s.

Water. 10. As the command of water in the Yard is limited, it is particularly requested that waste be avoided.

Subjection to Rules. 11. All persons admitted into the Showyard shall be subject to the Rules and Orders of the Directors.

Powers of Stewards. 12. The Stewards have power to enforce the Regulations of the Society in their different departments, and to bring to the notice of the Directors and Secretary any infringement thereof.

Attendants. 13. All persons in charge of Stock or other Exhibits shall be subject to the orders of the Secretary and Stewards.

Violation of Rules. 14. The violation by an Exhibitor of any one of the Regulations shall render him liable to the forfeiture of all Premiums awarded to him, or of such a portion as the Directors may ordain, and also liable to be disqualified from again, or for a certain number of years, exhibiting at the Shows of the Society; or to have his case otherwise disposed of as the Directors may determine.

15. Railway Certificates for Stock and Implements are issued to Exhibitors before the Show along with their Tickets of Admission, one Certificate for the outward and another for the return journey being sufficient for each Exhibitor for any number of exhibits.

*Railway
Passes.*

16. No animal or article can be withdrawn before the formal closing of the Show at 5 P.M. on Friday; Steam Engines not till 6 o'clock. Stock and Implements may remain in the Yard till Saturday afternoon.

*Removal of
Exhibits.*

17. The Premiums awarded, except those withheld till birth of calf or foal is certified, will be paid as soon after the Show as practicable, and, with the exception of the Tweeddale Gold Medal, Special Cups, and Medals, may be taken either in money or in plate.

*Payment
of Prizes.*

STOCK AND POULTRY.

18. Poultry and Stock will be admitted on Monday, the day before the opening of the Show, and, with the exception of Horses, must be in the Yard before 12 o'clock that night. Horses must be in before 8 o'clock on the morning of Tuesday, except those entered for Jumping only, regarding which special Regulations will be found beside the list of prizes for Jumping. Judging begins at 10 A.M. on Tuesday. Exhibited on Tuesday, Wednesday, Thursday, and Friday. Stock may be admitted on the Saturday preceding the Show, but only by sending two days' prior notice to the Secretary.

*Admission
of Stock.*

19. An animal which has gained a first Premium at a General Show of the Society cannot again compete in the same class, notwithstanding any alteration in the heights stated for such class, but may be exhibited as Extra Stock.

*Former
Winners.*

20. All animals, except calves, foals, and lambs shown with their dams, must be entered in the classes applicable to their ages, and cannot be withdrawn after entry, or other animals be substituted in their place.

*No substitution
of animals.*

21. For prizes given by the Society, no animal shall be allowed to compete in more than one class; but this Rule does not apply to the Jumping and Driving Competitions.

*One class
only.*

22. Shorthorn, Aberdeen-Angus, Galloway, and West Highland animals must be entered in the herd-books, or the Exhibitor must produce evidence that his animal is eligible to be entered therein.

*Herd-
books.*

23. Stock must be *bona fide* the property of the Exhibitor on the last day of Entry.

Ownership.

24. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor. The Society shall have power at any time to call upon an Exhibitor to furnish proof of the correctness of any statement in his entry.

25. The name of the Breeder, if known, must be given, and if the Breeder is not known, a declaration to that effect, signed by the Exhibitor, must be made on the Entry Schedule, and no pedigree will be entered in the Catalogue when the Breeder is unknown.

*Particu-
lars of
entries.*

26. Should it be proved to the satisfaction of the Directors that an animal has been entered under a false name, pedigree, or description, for the purpose of misleading the Directors or Judges as to its qualification or properties, or that information required in the Schedule and known or easily ascertained by the Exhibitor has been withheld, such animal may be disqualified either before or after a prize has been awarded to it, and the case may be reported to the Directors, in order that the Exhibitor may be disqualified from again competing at the Society's Shows, or his case otherwise disposed of as the Directors may determine.

*Entries
disquali-
fied.*

27. When an animal has previously been disqualified by the decision of any Agricultural Association in the United Kingdom, such disqualification shall attach, if the Exhibitor, being aware of the disqualification, fail to

state it, and the grounds thereof, in his entry, to enable the Directors to judge of its validity. Any person who is disqualified from exhibiting at any Show in the United Kingdom shall be prohibited from exhibiting at any General Show of the Society, unless with the special consent of the Board.

Height of Horses. 28. All Horses or Ponies entered in classes in which a particular height is stated shall before being judged be measured with their shoes on. No subsequent measuring or alteration of shoes will be permitted.

Overfeeding. 29. Breeding Stock must not be shown in an improper state of fatness, and the Judges are requested not to award Premiums to overfed animals; and no Cattle or Sheep which after the age of twelve months have been exhibited as Fat Stock at any Show are eligible to compete in the Breeding Classes for the Society's Prizes.

Parades. 30. Horses and Cattle must be paraded at the times stated in the Programme of the Show, and when required by the Stewards, and under their direction. In Parade, Horses must be ridden or led as provided in their respective classes. Prize and commended animals will receive two rosettes each, which must be attached to the head of the animal, one on each side. Attendants must be beside their animals *twenty minutes before the hour of Parade*, and be ready to proceed to the ring immediately on receiving the order of the Stewards. Infringement of this Rule, or failure of any attendant to obey the orders of the Society's officials, will render the Exhibitor liable to a fine of 20s. for each separate infringement or act of disobedience, and to the forfeiture of any or all of the Prizes awarded to him at this Show.

Responsibility of Exhibitors. 31. Exhibitors shall be answerable for all acts, whether committed by themselves, their servants, or others in charge of their Stock, and shall be responsible for the condition of their animals during the whole time they remain in the Showyard.

Moving from stalls. 32. No animal shall be taken out of its stall after 10 A.M. during the Show except by order of the Stewards, or with permission of the Secretary.

Cattle. 33. Cattle shall not be taken out of their stalls to be washed after the Judging has been finished. Those infringing this Rule shall be liable to a fine of 10s.

Scraping prohibited. 34. Soap or other adhesive material must not be used in dressing cattle or horses. Infringement of this Rule will render the animal upon which the material is used liable to be disqualified.

Sires. 35. Aged Bulls and Stallions must have had produce, and, along with two-year-old Bulls, three-year-old Colts, and two-shear and aged Tups, have served within the twelve months immediately preceding the Show.

Cows. 36. All Cows must have had calves previous to the Show. When exhibited, Highland Cows must be in milk or have calf at foot, and have had a calf within 9 months of the Show. Cows of other breeds, when exhibited, must either be in milk or in calf: if in milk, birth must have been within 9 months of the Show; if in calf, birth must be certified within 9 months after the Show. Animals of any age that have had a calf must be shown as Cows.

In-calf Heifers. 37. Two-year-old Heifers of the Shorthorn, Aberdeen-Angus, and Galloway breeds, two-year-old Yeld Ayrshire Heifers, and three-year-old Highland Heifers, must be in calf when exhibited, and the Premiums will be withheld till birth be certified, which must be within 9 months after the Show.

Mares. 38. A Mare entered in a class for "Mares with foal at foot" must have produced a foal after 1st January of the year of the Show, must have regularly nursed her own or another foal, and must have the foal with her in the Show. If the mare's own foal is alive it must be the foal shown with the mare. In the case of a Mare that has not foaled before the Show, or whose foal has died, she shall, if not in milk, be eligible without further entry to compete among the Yeld Mares. Agricultural

Yield Mares must produce a foal within 12 months from the first day of the Show. A Mare in a class for "Mares or Geldings" may or may not have had a foal in the year of the Show, but shall not have her foal exhibited with her, nor be in milk at the time of the show.

39. With reference to Regulations 36 and 37, birth of at least a seven months' calf must be certified; and in regard to Regulation 38, birth of at least a nine months' foal; or in the case of the death of the dam, a Veterinary Surgeon's certificate must be produced certifying that at the time of death the animal was so far advanced with calf or foal that if it had lived it would have produced a calf or foal, as required by Rules 36, 37, and 38. Certificates of calving required by the foregoing Regulations must reach the office of the Secretary within ten months of the last day of the Show; foaling certificates within thirteen months of the last day of the Show. In default of this, the animal will be regarded as having failed to fulfil the Regulations, and the prize will therefore be forfeited. *Calves and Foals. Calving and Foaling Certificates.*

40. Except when otherwise provided the awards of Special Prizes shall not be subject to the Regulations as to calving and foaling. *Special Prizes.*

41. Any artificial contrivance or device of any description found on or proved to have been used on an animal, either for preventing the flow of milk or for any other improper purpose, will disqualify that animal from being awarded a Premium, and the Owner of said animal shall be prohibited from again entering Stock for any of the Society's General Shows, for such a period as the Directors may see fit. *with animals.*

42. During the time the Show is open to the public no rug shall be hung up so as to conceal any animal in a horse-box or stall, except with the special permission of the Steward of that department. *Concealing animals.*

43. In the classes for Hunters Judges are empowered to transfer to the proper classes horses which, in regard to weight-carrying, are in their opinion entered in the wrong classes. *Hunters.*

44. Judges are particularly requested to satisfy themselves, as far as possible, regarding the soundness of all Horses before awarding the Prizes, and to avoid giving Prizes to animals showing symptoms of hereditary diseases. The Judges may consult the Society's Veterinary Surgeon if they deem it expedient. No protests on veterinary grounds will be received. *of Horses.*

45. All Ewes must have reared lambs in the year of the Show; and Ewes of the Blackfaced and Cheviot breeds must be in milk, and have their lambs at foot. *Ewes.*

46. Sheep must have been clipped bare after 1st January of the year of the Show, and the Judges are instructed to examine the fleeces of the Sheep selected for Prizes, and to cast those on which they find any of the former fleece. This Rule does not apply to Cheviot sheep. *Clipping.*

47. Sows must have reared pigs in the year of the Show or be in pig; Sows and Pigs must belong to the same litter, and be uncut. *Sows.*

48. In Poultry the Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show. *Poultry.*

49. Bulls must be secured by nose-rings, with chains or ropes attached, or with strong halters and double ropes. All Cattle, other than Highland Cattle, must be tied in their stalls. *Securing Cattle.*

50. Servants in charge of Stock must bring their own buckets or pails, and a piece of rope or sheep-net to carry their forage. Mangers, sheep and pig troughs, will be provided. *appliances.*

51. Loose-boxes will be provided for Stallions, three-, two-, and one-year-old entire Colts; for two- and one-year-old Fillies, and for Mares with foals at foot; closed-in stables for all the other Horses, and covered accommodation for the whole of the other Live Stock. In no case, either in the ordinary classes or "Extra Stock," will a box be provided except for the classes here specified. Stalls (floored) for attendants on Cattle, Horses, and Sheep will be provided at same rates as those charged for *accommodation for animals.*

*Floored
stalls for
animals.*

Stock. Exhibitors requiring floored stalls for their animals must give notice to the Showyard contractor, Mr Farquhar, Showyard, ten days before the Show opens.

Fodder.

52. Five days' supply of straw, hay, grass, and tares will be provided free by the Society. Any additional fodder or other kinds of food required will be supplied at fixed prices in the Forage-yard. Any servant removing bedding from an adjoining stall will be fined in double the amount taken. Exhibitors may fetch their own cake or corn to the Yard, but not grass, tares, hay, or straw. Sawdust must not be used as bedding for Stock. Coops, food, and attendance for Poultry will be provided by the Society.

Removal.

53. Cattle, Sheep, Swine, or Poultry cannot be removed from the Yard till 5 P.M. on Friday, the last day of the Show, except on certificate by the Veterinary Surgeon employed by the Directors, countersigned by the Steward of the department or the Secretary.

*With-
drawal of
horses over
night.*

54. Horses may be withdrawn at the close of the Show on Tuesday, Wednesday, and Thursday, on a deposit of £5 for each animal, which shall be forfeited, along with any prize money it may have gained, if the animal is not brought back. They must return between 7 and 7.30 the following morning, and those not in before 8 shall forfeit 10s. Horse passes to be applied for at the Secretary's Office between 5 and 6 P.M. on Tuesday, and the deposit, unless forfeited in whole or in part, will be returned between 12.30 and 2.30 on Friday.

*Order in
removal.*

55. When the Stock is leaving the Yard, no animal is to be moved till ordered by those in charge of clearing the Yard. Those transgressing this Rule shall be liable to a fine of 10s., and detained till all the other Stock is removed.

*Penning
and
removing
Poultry.*

56. Poultry may be penned before the opening and removed at the close of the Show by Exhibitors themselves or their representatives. In the event of neither the Exhibitor nor an authorised representative of the Exhibitor being present to pen or remove Poultry, the birds will be penned and removed by men hired and paid by the Society, but this will be done on the understanding that the men are hired to do the work on behalf of Exhibitors, and solely at their risk, and that the Society will be in no way responsible for expenses incurred or loss of or injury to Exhibits by errors or accidents in penning, despatching, or conveying Exhibits.

*Closing of
Poultry
Shed.*

57. On the opening day of the Show the Poultry Shed will be closed to the public during the Judging. On the last day of the Show the Poultry Shed will be closed to the public at 4 P.M.; at 5 P.M. Exhibitors or their representatives will be admitted to the Shed to remove Exhibits, provided the Exhibitor has, *not later than 11 A.M. on the last day of the Show*, given written notice to the Secretary to the effect that the Exhibitor or the Exhibitor's representative will attend at the Poultry Shed at 5 P.M. to remove the birds.

JUDGING STOCK AND POULTRY.

*Opening
Gates.*

58. On Tuesday, the first day of the Show, no person will be admitted, except Servants in charge of Stock, till 8 A.M., when the Gates are opened to the public.

Judging.

59. The Judges will commence their inspection at 10 A.M. The spaces reserved for the Judging will be enclosed, and no encroachment shall be permitted.

*Insufficient
merit.*

60. In no case shall a Premium be awarded unless the Judges deem the animals to have sufficient merit; and where only one or two lots are presented in a section, and the Judges consider them unworthy of the Premiums offered, it shall be in their power to award a lower prize, or to suggest the removal of any lot which appears to them unworthy of a place in the Yard.

61. In addition to the Premiums, the Judges are authorised to award three Commendations in each section, if the entries are numerous and the animals of sufficient merit. These Commendations consist of—Very Highly Commended, Highly Commended, and Commended. *Commendations.*

62. Ayrshire Cows which have not calved before the Show, whether entered in the class for Cows in Milk or for Cows in Calf, shall be judged along with the Cows in Calf, and Ayrshire Cows or Heifers which have calved before the Show—in whichever of the two classes entered—shall be judged along with Cows in Milk. *Ayrshire Cows and Heifers.*

63. One Member of Committee and one or two Directors shall attend each section of the Judges. It will be their duty to bring the animals out to the Judges and to see that no obstruction is offered to them, and that the space reserved for them is not encroached upon; to ticket the prize animals; to send the Nos. of prize animals to the Award Lectern near the Secretary's office; to assist the Judges in completing their return of awards; and should any difficulty arise, to communicate with the Stewards or Secretary. *Attending Members.*

64. It shall not be competent for any Exhibitor, nor for his Factor or Land-Steward, to act as a Judge or attending Member in any class in which he is competing.

DAIRY PRODUCE.

65. Dairy Produce will be received in the Showyard on Monday, the day before the opening of the Show, and till 8 A.M. on Tuesday, the first day of the Show. Judged at 10 A.M. on Tuesday. Exhibited Tuesday, Wednesday, Thursday, and Friday.

66. Dairy Produce must have been made on the Exhibitor's farm this year. No Exhibitor shall show more than one lot in each class. No lot can be removed from the Yard till 5 P.M. on Friday, the last day of the Show. The Society undertakes no responsibility for the receipt or despatch of exhibits, nor for the loss of exhibits, nor for any injury they may sustain during the Show.

STALL RENT (INCLUDING ENTRY FEE).

67. The following rates (which include Entry Fees and Stall Rent) shall be paid by Exhibitors when making their Entries:—

	Members.	Non-Members.
	s. d.	s. d.
Stalls for Cattle, each	15 0	25 0
Boxes for Horses in Classes 37, 38, 39, 44, 54, 55, 56, 60, and 61	30 0	40 0
Boxes for Horses in Classes 40, 47, 48, 49, 50, 58, 59, 62, 63, 64, 65, 69, 71, 72, 74, 75, and 76	22 6	32 6
Stalls for Horses in Classes 41, 42, 43, 45, 46, 51, 52, 53, 57, 79, and 80	20 0	30 0
Stalls for Ponies in Classes 66, 67, 68, 70, 73, 77, and 78	15 0	20 0
Shed Accommodation for Machines for driving competitions, each	5 0	10 0
Sheep or Swine, per pen	10 0	15 0
Poultry, each entry	2 0	3 0
Dairy Produce, each entry	4 0	6 0
Covered Booths for offices, 9 feet by 9 feet	70 0	100 0
Newspaper offices	£2, 10s.	

Entries in more than one Class.—In the case of animals entered in more than one class, the entry fee, whether for Post or other Entries, shall be five shillings for each class after the first. This does not apply to the Jumping Competitions.

EXTRA STALL FOR ATTENDANTS.

68. Exhibitors of Stock shall be entitled to take an extra Stall or Box for the accommodation of their attendants, but they must state when making their Entry that the Stall or Box is to be used for that purpose, and remit rent, which is at the same rate as stated above for the particular class of stock. They must also state next to which animal they wish the attendant's accommodation to be placed.

IMPLEMENTS AND OTHER ARTICLES.

- Admission.* 69. Implements will be received in the Yard from Tuesday 12th July, till 5 o'clock on the afternoon of Monday, 18th July. Exhibited Tuesday, Wednesday, Thursday, and Friday. The Schedule of Entry must be filled up so far as within the knowledge of the Exhibitor, and prices must be stated.
- Premiums.* 70. No Money Prizes or Medals, except when specially offered, will be given by the Society for Implements of any kind.
- Refusing Entries.* 71. Agricultural Implements, and Implements and collections of articles not Agricultural, will be received for Exhibition, but the Secretary is entitled to refuse Entries from dealers in articles not deemed worthy of Exhibition.
- Local Operatives.* 72. In order to encourage exhibits of Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show, open space will be provided for these in some less prominent part of the Yard at a charge of 10s. for space 10 feet wide and 20 feet deep.
- Order of Implements.* 73. Implements will be entered in the following sections—viz., 1st, Space without Shedding, 20 feet deep; 2nd, Shedding, 20 feet deep, 7 feet high to eave; 3rd, Shedding, 20 feet deep, 7 feet high to eave, boarded at back; 4th, Motion Yard, without Shedding, 50 feet deep; 5th, Motion Yard, 50 feet deep, with Shedding, 20 feet wide, 10 feet high to eave; 6th, Open space for Agricultural Implements from operative Blacksmiths and Carpenters in the district of the Show. Exhibitors must specify the space they require.
- Articles not entered.* 74. Every article to be exhibited must be entered on the Society's Entry Form. Any article not so entered that is taken to the Show is liable to be ordered out of, or removed from, the Showyard, or confiscated to the Society. Exhibitors infringing this rule are moreover liable to a fine of £1.
- Selling by auction and noisy behaviour forbidden.* 75. "Cheap-Jacks" are not admitted to the Showyard. The selling of goods by auction, shouting, and other behaviour calculated to annoy visitors or Exhibitors, are strictly forbidden. Exhibitors infringing this Regulation are liable to a fine of £1, and to have themselves and their goods ordered out of, or removed from, the Showyard, or to have their goods confiscated to the Society.
- Placing Exhibits.* 76. The articles of each Exhibitor must be all placed in one stand, except Implements in motion, and must not on any account extend beyond the allotted space. No article shall be moved out of its stand, or the stand dismantled, till the termination of the Show, at 5 p.m. on Friday. Those infringing this Rule shall be liable to a fine of 10s.
- Removing Exhibits.* 77. When the ground requires to be broken, the turf must be carefully lifted and laid aside, and the surface must be restored to the satisfaction of the Society, and at the expense of the Exhibitor. Failing this being done, the Society shall be at liberty to restore the ground and charge the cost to the Exhibitor.
- Restoring Turf.* 78. Exhibitors must arrange their own articles *within* the space allotted to them before 9 o'clock on Tuesday, and to the satisfaction of the Stewards in charge of the Implement Yard.
- Handbills.* 79. Exhibitors are not allowed to distribute handbills anywhere in the

Yard except at their own Stand ; and they must not for this or any other purpose encroach upon the adjacent alleys or open spaces.

80. Exhibitors are required to have their Stands and the portions of the alleys immediately adjoining them swept up before eight o'clock on each morning of the Show. *Sweeping Stands, etc.*

81. All Machines requiring steam or fire must be entered as such in the Certificate, and will be placed in the Motion Yard. *Coke only shall be used in all cases where fire is required.* Coal shall not be used at any time in the Showyard. Those infringing this Rule shall incur a penalty of £5. *Fuel.*

82. No Steam Engine shall be driven in the Yard at a greater speed than 4 miles an hour. Traction Engines shall not be used in conveying Exhibits or other goods into, from one place to another in, or out of the Showyard. *Steam Engines.*

83. Locomotive and Traction Engines and other Machines must not be moved from their places without permission of the Secretary or Stewards, and must not leave their stands till 6 P.M. on Friday.

84. There must be attached to each Implement, when forwarded to the Show, a label bearing the Exhibitor's name, and that of the Implement, as well as the number of the Exhibitor's stand. *Consigning Implements.*

85. The carriage of all Implements must be prepaid.

86. Each Exhibitor in the Implement Department will receive one free Ticket of Admission to the Showyard for himself or a member of his firm, and will receive, in addition, for the use of attendants employed by him at his Stand, two Tickets of Admission for each complete ten feet of shedding in the Motion Yard, and one Ticket for each complete ten feet of shedding in the other sections. No additional Free Tickets can be issued in any circumstances whatever. Additional Attendants' Tickets, not more than five for any one Exhibitor, may be purchased at 5s. each. *Exhibitors' and Attendants' Tickets.*

87. The Tickets of Admission for Exhibitors and Attendants referred to in the foregoing Regulation will (about fourteen days prior to the Show) be issued to the Exhibitors in blank, with the number of the Exhibitor's Stand. The name of the person for whom each ticket is intended must be written on it before it is used. Each person holding a Free Ticket of Admission must sign his or her name on the back thereof, and must also, when required, sign his or her name in the book at the Entrance Gate. Exhibitors' attendants are strictly cautioned not to lend or transfer their Tickets, which can be used only by the persons whose names they bear, and who must be *bona fide* acting for, or employed by, the Exhibitor. No Ticket is transferable. An Exhibitor is liable to a fine of £1 for each case of transfer or other improper use of a Ticket issued to himself or employee. *Tickets to be filled up and signed. Tickets not Transferable. Improper use of Tickets.*

STALL RENT.

88. Ground to be taken in spaces of 10 feet frontage by 20 feet deep, except in Motion Yard, which is to be 10 feet or any larger amount of frontage by 50 feet deep. Exhibitors must take their space wholly covered or wholly open. Space is not let partly covered and partly open.

89. Rates for space, payable by Exhibitors when making their Entries:—

	Members	Non-Members.
Space without Shedding, 20 feet deep, per 10 feet .	£1 5 0	£1 15 0
Shedding, 20 feet deep, 7 feet high to eave, per 10 feet	1 5 0	1 15 0
Shedding, 20 feet deep, 7 feet high to eave, <i>boarded at back</i> , per 10 feet .	1 12 0	2 2 0
Space in Motion Yard, without Shedding, 50 feet deep, per foot .	0 5 0	0 8 0
And with Shedding, 20 feet deep, 10 feet high to eave, per foot .	0 7 0	0 10 0
Covered Booths for offices, 9 feet by 9 feet, each .	3 10 0	5 0 0
Newspaper offices, each .	£2, 10s.	

ADMISSION OF THE PUBLIC.

The public will be admitted daily at 8 A.M. Judging begins on Tuesday at 10 A.M. The charges for admission to the Yard will be—Tuesday, from 8 A.M. till 5 P.M., 5s. Wednesday, from 8 A.M. till 5 P.M., 3s. Thursday, from 8 A.M. till 5 P.M., 2s.; from 5 P.M. till 8 P.M., 1s. Friday, from 8 A.M. till 5 P.M., 1s.

ADMISSION OF MEMBERS AND EXHIBITORS.

On exhibiting their "*Member's Ticket*," which is strictly not transferable, Members of the Society are admitted free to the Showyard and to the Enclosures and Stands around the Large Ring, excepting the Reserved Seats in the Grand Stand, and such other parts as may be reserved for any special purpose. Tickets will be sent to all Members residing in the United Kingdom whose addresses are known, and on no account will duplicates be issued. All Members not producing their tickets must pay at the gates, and the admission money will not on any account be returned. Tickets must be signed by Members before being presented at the gate.

Tickets of admission to the Showyard are sent to Exhibitors of Stock, Poultry, and Dairy Produce (not Members) whose Entry Fees amount to not less than 10s.

For Exhibitors of Implements and their assistants tickets are issued as provided in the Regulations for Implements.

Tickets for attendants on Stock are not available to admit to the Yard between 11 A.M. and 5 P.M.; and any of these attendants requiring to leave the Yard during the day cannot be again admitted except by a special pass (to be applied for at the Ticket Gate), which must be given up on his return.

RESERVED SEATS IN GRAND STAND.

Reserved Seats in the Grand Stand (numbered).

For Charges, apply to Secretary.

VARIOUS.

Placards, except those of the Society, are prohibited both inside the Showyard and on the outside of the Boundary Fence, with the exception of those belonging to Exhibitors, whose right is confined to their own stalls. No newspapers or any other article allowed to be carried about the Yard for sale or display. No strolling bands or musicians admitted.

No Carriages or Equestrians admitted without special leave from the Directors, and then only for Invalids. Bath-chairs may be brought in.

Premium Lists, Regulations, and Certificates of Entry may be obtained by applying at the Secretary's Office, No. 3 George IV. Bridge, Edinburgh.

All Communications should be addressed to JAMES MACDONALD, Esq., Secretary of the Highland and Agricultural Society of Scotland, No. 3 George IV. Bridge, Edinburgh. From 13th to 22nd July to the Secretary's Office, Showyard, Perth.

Address for Telegrams—"SOCIETY," EDINBURGH.

LAST DAYS OF ENTRY.

IMPLEMENTS AND OTHER ARTICLES—Monday, 16th May.

STOCK, POULTRY, AND DAIRY PRODUCE—Monday, 13th June.

No Entry at ordinary fees taken later than those which are received at the Society's Office, Edinburgh, by first post, or 10 o'clock, on Monday morning (13th June). Post Entries for Cattle, Horses, Sheep, and Swine taken on payment of 10s. additional for each entry (Poultry at double fees) till Wednesday morning (15th June), at the Society's Office, Edinburgh, at 10 o'clock.

COVERED BOOTHS FOR OFFICES—Monday, 13th June.

RAILWAY ARRANGEMENTS.

The Railway Companies will be furnished with a list of the Exhibitors of Stock and Implements, after the 2nd July, and all applications for horse-boxes and trucks, and for information as to arrangements of Special Trains, must be made by the Exhibitors themselves to the Stationmaster where their stock is to be trucked.

The arrangements made by the Railway Companies for the conveyance of Live Stock and Goods to and from the Show are indicated below, but exhibitors are recommended to apply to the respective companies for full particulars:—

1. Live Stock and Goods to the Show to be charged ordinary rates.
2. Live Stock and Goods from the Show, *if sold*, to be charged ordinary rates.
3. Live Stock and Goods from the Show, *if unsold*, to be carried at half rates back to the station whence they were sent, at owners' risk, on production of a certificate from the Exhibitor to the effect that they are really unsold; failing production of such certificate, ordinary rates must be charged. The reduction to half rate is to be allowed only when the animals or goods are returned by the same route as that by which they were conveyed to the Show. The minimum charge for Stock returned at half rates will be one-half the ordinary minimum.

If the unsold Live Stock which was carried on the outward journey by Passenger Train in horse-boxes be required to be returned by Goods Train in cattle trucks, half the Goods Train rates must be charged.

If the unsold Live Stock which was carried on the outward journey by Goods Train in cattle trucks be required to be returned by Passenger Train in horse-boxes, half the Passenger Train rates must be charged.

4. Horses and Cattle, when sent for exhibition from one Agricultural Show to another, in another part of the country, are charged the ordinary single rates in respect of each journey, from point to point, up to the last station to which they are sent for exhibition. If remaining unsold when returned from the latest Show to the originating or home station, they are—on production of the necessary certificates—charged half rates, provided such return journey is made by the line of the company by whose route it was conveyed on the outward journey, and provided the railway traversed was covered on the outward journey. If conveyed by Goods Train, Unsold Live Stock transferred from one Agricultural Show to another in another part of the country must be charged ordinary rates.

5. Unsold goods, previously carried by railway, transferred from one Agricultural Show to another, in another part of the country, will be conveyed at half rates at owners' risk, on production of certificate from the Exhibitor to the effect that they are unsold; failing production of such certificate, ordinary rates will be charged.

6. Poultry to be charged ordinary rates both ways, and will not be accepted for conveyance unless the carriage charges are prepaid.

7. Horse-boxes, or other Passenger Train vehicle, will not be provided for the carriage of Live Stock sent by Goods Train and invoiced at Goods Train rates. *For rates for Horse-boxes by Passenger and Special Trains, apply to the Railway Companies.*

8. Provender conveyed to Agricultural Shows with Live Stock will be charged ordinary rates, except so much of the same as may be required on the journey.

9. Men, certified by the owners to be *bona fide* in charge of Live Stock, to be conveyed free in the same train as the animals, as follows: One man for each consignment, except where the consignment requires more than one vehicle, when one man for each vehicle may be sent free; but no pass is given unless the charge for the consignment amounts to as much as the charge for one horse. When two or three horses forming one consignment are sent in the same horse-box, and a man is required to travel with each animal, the men may be conveyed free, provided each horse is charged at the single horse rate. Upon both the outward and homeward journeys a separate certificate and contract must be given, which must be retained by the stationmaster at the outward or homeward starting-point, as the case may be.

10. The ordinary rates charged for carriage do not in any case include delivery to, or collection from, the Show ground.

11. Agricultural Societies' Show Plant must be charged at Class C rates, station to station.

12. Tents, Canvas, and other articles carried to Shows, not for exhibition, to be charged the ordinary rates both going and returning.

13. The carriage of all Live Stock, Implements, and other articles going to the Show for exhibition must be *prepaid*.

DELIVERY CHARGES.

The following will be the Charges for the Delivery or Collection of Live Stock, Implements, and other articles between the Railway Station at Perth and the Show ground:—

1. General traffic, 2s. 6d. per ton (minimum charge, 1s. 6d.)
2. Implements and Machinery (Agricultural), not exceeding 1 ton each, 2s. 6d. per ton (minimum charge, 2s.)
3. Implements and Machinery (Agricultural), on their own wheels (specially hauled), not exceeding 1 ton, 2s. 6d. each.
4. Single articles, exceeding 1 ton, but not exceeding 3 tons, 3s. per ton.
5. Single articles, exceeding 3 tons, but not exceeding 5 tons, 6s. per ton.
6. Single articles, exceeding 5 tons, by special arrangement only, but no less charge than 8s. per ton.
7. Rustic Houses, by special arrangement only, but no less charge than 7s. 6d. each.
8. Carriages, four-wheeled, 2s. 6d. each.
9. Carriages, two-wheeled, 1s. 6d. each.
10. Cattle, in floats, 2s. 6d. per head.
11. Sheep and Pigs, in floats, 9d. per head (minimum charge, 2s. 6d., and maximum charge, 5s. for each float).

THE PRESIDENT'S CHAMPION MEDALS

A Champion Medal is given by THE EARL OF MANSFIELD, President of the Society, for the best *Animal or pen* in each of the following sections:—

- | | | |
|--------------------------|----------------------------------|-----------------------|
| 1. Shorthorn. | 9. Clydesdale Mares and Fillies. | 17. Blackfaced Sheep. |
| 2. Aberdeen-Angus. | 10. Hunters. | 18. Cheviot. |
| 3. Galloway. | 11. Hackneys. | 19. Border Leicester. |
| 4. Highland. | 12. Harness Horses. | 20. Shropshire. |
| 5. Ayrshire. | 13. Ponies. | 21. Half-bred. |
| 6. Fat Cattle. | 14. Polo and Riding Ponies. | 22. Oxford Down. |
| 7. Clydesdale Stallions. | 15. Highland Ponies. | 23. Suffolk. |
| 8. Draught Geldings. | 16. Shetland Ponies. | 24. Swine. |

NOTE.—Animals entered as Extra Stock may compete for these Medals. Former Winners of the President's Medals are eligible. The Society shall have the right to photograph the Winners for publication in the 'Transactions.' At this Show no animal can be awarded more than one of these Medals.

CATTLE

Class	SHORTHORN.	Premiums.			
		1st.	2nd.	3rd.	4th.
		£	£	£	£
1.	Bull calved before 1902 . . .	15	10	5	3
2.	Bull calved in 1902 . . .	15	10	5	3
3.	Bull calved in 1903 . . .	12	8	4	2
	¹ Best Shorthorn Bull in the Show, entered or eligible for entry in Coates's Herd-Book—£25. Breeder of best Bull of any age in the three Classes—The Silver Medal.				
4.	Cow of any age . . .	12	8	4	2
5.	Heifer calved in 1902 . . .	10	5	3	2
6.	Heifer calved in 1903 . . .	10	5	3	2
	¹ Best Shorthorn Female in the Show, entered or eligible for entry in Coates's Herd-Book—£25. <i>President's Medal for best Shorthorn.</i>				
					£158

ABERDEEN-ANGUS.

² Two Silver Cups, each of the value of £50, for the best Bull of any age and for the best Cow of any age (Heifers excluded) in the Aberdeen-Angus cattle classes. These are to be Challenge Cups, and are to be known as the "Ballindalloch Challenge Cups." They are offered under the following conditions: 1. The Directors shall assume charge of the Cups, and shall frame such rules for their safety as they may decide upon. 2. Each Cup shall be held by the winner for one year as a Challenge Cup, and shall become the property of the exhibitor who shall win it five times, not necessarily in succession. 3. The Society shall, at their own expense, cause to be engraved on each Cup each year, the year, the place of the Show, name of successful exhibitor, name and herd-book number of the animal, and name of its breeder. 4. The Society shall award to the breeder of the successful animals a Silver Medal, bearing that he is the breeder of the winner of the "Ballindalloch Challenge Cup." 5. In every other respect the Cups shall be won according to regulations which the Directors may from time to time enact.

7.	Bull calved before 1st Dec. 1901 . . .	15	10	5	3
8.	Bull calved on or after 1st Dec. 1901 . . .	15	10	5	3
9.	Bull calved on or after 1st Dec. 1902 . . .	12	8	4	2
	² Champion Cup, value £50, for the best Bull in the three Classes. Breeder of best Bull of any age in the three Classes—The Silver Medal.				
10.	Cow of any age . . .	12	8	4	2
	² Champion Cup, value £50, for the best Cow of any age in the above Class.				
					118

Carry forward £276

¹ Given by the Shorthorn Society.

² The Cup for Bulls given by Sir George Macpherson Grant, Bart., and that for Cows by the late Mr C. Macpherson Grant of Drumduan.

Brought forward £276				
Premiums.				
ABERDEEN-ANGUS— <i>continued</i> .				
Class	1st.	2nd.	3rd.	4th.
	£	£	£	£
11. Heifer calved on or after 1st Dec. 1901	10	5	3	2
12. Heifer calved on or after 1st Dec. 1902	10	5	3	2
¹ Champion Gold Medal for best breeding animal of the breed in the Showyard.				
<i>President's Medal for best Aberdeen-Angus Animal.</i>				40
GALLOWAY.				
13. Bull calved before 1st Dec. 1901	15	10	5	3
14. Bull calved on or after 1st Dec. 1901	15	10	5	3
15. Bull calved on or after 1st Dec. 1902	12	8	4	2
Breeder of best Bull of any age in the three Classes—The Silver Medal.				
16. Cow of any age	12	8	4	2
17. Heifer calved on or after 1st Dec. 1901	10	5	3	2
18. Heifer calved on or after 1st Dec. 1902	10	5	3	2
<i>President's Medal for best Galloway.</i>				158
HIGHLAND.				
19. Bull calved before 1902	15	10	5	3
20. Bull calved in 1902	15	10	5	3
21. Bull calved in 1903	12	8	4	2
Breeder of best Bull of any age in the three Classes—The Silver Medal.				
22. Cow of any age, in Milk, or with Calf at foot	12	8	4	2
23. Heifer calved in 1901	10	5	3	2
24. Heifer calved in 1902	10	5	3	2
<i>President's Medal for best Highland Animal.</i>				158
AYRSHIRE.				
25. Bull calved before 1902	12	8	4	—
26. Bull calved in 1902	10	7	3	—
27. Bull calved in 1903	8	5	3	—
² Champion Prize of £10 for best Ayrshire Bull in the Showyard, entered with a number in the Ayrshire Cattle Herd-Book.				
Breeder of best Bull of any age in the three Classes—The Silver Medal.				
28. Cow calved before 1901 in Milk	12	8	4	—
29. Cow in Milk, calved after 1st Jan. 1901	10	7	3	—
				104
Carry forward				£736

¹ Given by the Polled Cattle Society.² Given by the Ayrshire Cattle Herd-Book Society.

Brought forward		...	...	£736
		Premiums.		
Class		1st.	2nd.	3rd.
		£	£	£
30.	Cow of any age in Calf, or Heifer calved in 1901 in Calf and due to calve within nine months after the Show	10	7	3
31.	Heifer calved in 1902	10	5	3
32.	Heifer calved in 1903	8	5	3
¹ Champion Prize of £10 for best Ayrshire Female in the Showyard, entered with a number in the Ayrshire Cattle Herd-Book.				
<i>President's Medal for best Ayrshire.</i>		<hr/>		
54				
FAT CATTLE.				
33.	Ox, any pure breed or cross, calved after 1st Dec. 1901	5	2	—
34.	Ox, any pure breed or cross, calved after 1st Dec. 1902	5	2	—
35.	Heifer, any pure breed or cross, calved after 1st Dec. 1901	5	2	—
36.	Heifer, any pure breed or cross, calved after 1st Dec. 1902	5	2	—
<i>President's Medal for best Fat Animal.</i>		<hr/>		
28				
		<hr/>		
£818				

HORSES

FOR AGRICULTURAL PURPOSES.

		Premiums.			
DRAUGHT STALLIONS.		1st.	2nd.	3rd.	4th.
		£	£	£	£
37.	Stallion foaled before 1901	20	15	10	4
38.	Entire Colt foaled in 1901	20	15	10	4
39.	Entire Colt foaled in 1902	20	12	8	4
40.	Entire Colt foaled in 1903	15	10	6	4
Breeder of best Male Animal of any age in the four Classes—The Silver Medal.					
Best Clydesdale Stallion or Colt—Cawdor Challenge Cup, value 50 guineas. See conditions on next page.					
					£177

President's Medal for best Clydesdale Stallion or Colt.

No animal is allowed to compete in more than one Class, except that horses entered in other Classes may also compete in the Jumping and Driving Classes.

¹ Given by the Ayrshire Cattle Herd-Book Society.

Class	DRAUGHT GELDINGS.	Brought forward £177			
		Premiums.			
		1st.	2nd.	3rd.	4th.
		£	£	£	£
41.	Draught Gelding foaled before 1901	10	5	3	—
42.	Draught Gelding foaled in 1901 .	6	4	3	—
43.	Draught Gelding foaled in 1902 .	6	4	3	—

44

President's Medal for best Draught Gelding.

DRAUGHT MARES AND FILLIES.

44.	Mare of any age, with Foal at foot	20	12	7	4
45.	Yeld Mare foaled before 1901 .	12	9	6	4
46.	Yeld Mare or Filly foaled in 1901 .	12	9	6	4
47.	Filly foaled in 1902 .	12	9	6	4
48.	Filly foaled in 1903 .	12	9	6	4

167

Best Clydesdale Mare or Filly—Cawdor Challenge Cup, value 50 guineas. See Conditions below.

CONDITIONS OF COMPETITION FOR THE CAWDOR CHALLENGE CUPS. (VALUE 50 GUINEAS EACH.)

1. These Cups are offered by the Clydesdale Horse Society of Great Britain and Ireland for the best Clydesdale Stallion or Colt, and Mare or Filly registered in the Clydesdale Stud-Book, entered in any of the Draught Horse classes, at the Show at which they may be competed for.

2. The Council of the Clydesdale Horse Society shall, at a meeting held not later than the month of August in any year, decide at what Show or Shows the "Cawdor Challenge Cups" shall be competed for in the year immediately following.

3. Either of these Cups must be won three times by an Exhibitor with different animals (but not necessarily in consecutive years) before it becomes his absolute property; and immediately after an award has been made, and official notification thereof has been received by the Secretary of the Clydesdale Horse Society from the Secretary of the Society under whose auspices the Competition has taken place, the name of the winner, and of the animal with which the Cup has been won, will be engraven on the Cup.

4. The winner of either of the Cawdor Challenge Cups, other than the absolute winner, shall, before delivery thereof is made to him, give security to the Clydesdale Horse Society that he shall surrender the same to the Society and deliver it at the Society's office when called upon to do so.

5. Until the Cup be won outright, the winner of each of the Cawdor Challenge Cups will receive the Clydesdale Horse Society's Silver Medal as a memento of his winning the Cup; and the said Medal shall bear an inscription specifying the Show at which, the date on which, and the name of the animal

Carry forward £388

Brought forward £388
with which the Challenge Cup has been won, as well as the
name of the owner.

In name of the Council of the Clydesdale Horse Society,

ARCHD. MACNEILAGE, *Secretary*.

¹ Breeder of Best Clydesdale Brood Mare—The Robert
Murdoch Prize, value £10.

President's Medal for best Clydesdale Mare or Filly.

Class	HUNTERS.	Premiums.		
		1st.	2nd.	3d.
		£	£	£
49.	Colt, Gelding, or Filly, foaled in 1903, the produce of thoroughbred Stallions, out of Mares of any breed,—Five Prizes ² —£10, £7, £5, £2, £1.			
50.	Filly, Mare, or Gelding, for field, foaled in 1902— <i>in hand</i> .	8	5	3
51.	Yield Mare, Filly, or Gelding, for field, foaled in 1901— <i>in hand</i> .	8	5	3
	³ Best Hunter Filly in Classes 49, 50, and 51, registered or entered in the Hunter Stud-Book — Gold Medal, value £10, 10s.			
52.	Made Hunters, any age, able to carry up to 13 stone . . .	15	10	5
53.	Made Hunters, any age, able to carry over 13 stone . . .	15	10	5
54.	⁴ Hunter Brood Mare, with foal at foot or to foal this season—£15, £8, £4.			
				92
<i>President's Medal for best Hunter.</i>				

HACKNEYS.

(*All to be shown in hand.*)

55.	Brood Mare, 15 hands and upwards, with Foal at foot, or to foal this season to a registered Sire .	10	6	4
56.	Brood Mare, under 15 hands, with Foal at foot, or to foal this season to a registered Sire . . .	10	6	4
				40
Carry forward				£520

¹ Bequest by the late Miss Murdoch.

² Given by Sir John Gilmour of Montrave, Bart.

³ Given by the Hunter Improvement Society.

⁴ Given by Captain Clayhills Henderson of Invergowrie, R.N.

Class	HACKNEYS— <i>continued.</i>	Brought forward			£520		
		...			Premiums.		
		1st.	2nd.	3rd.	1st.	2nd.	3rd.
		£	£	£			
57.	Yeld Mare or Filly, foaled in 1901	8	5	3			
58.	Filly, foaled in 1902	8	5	3			
59.	Filly, foaled in 1903	8	5	3			
60.	Stallion, foaled in or before 1901, over 15 hands	10	6	4			
61.	Stallion, foaled in or before 1901, over 14 and not over 15 hands	10	6	4			
62.	Entire Colt, foaled in 1902.	8	5	3			
63.	Entire Colt, foaled in 1903.	8	5	3			
					120		

All animals entered in the above Hackney Classes must be registered in the Hackney Stud-Book except in Classes 59 and 63, and animals entered in Classes 59 and 63 must be eligible for entry in the Hackney Stud-Book.

- ¹ A Champion Prize of £10, or a Gold Medal of the same value, at the option of the Exhibitor, is offered by Hackney Horse Society for best Mare or Filly in Hackney or Pony Classes.

President's Medal for best Hackney.

PONIES.

64.	Stallion, 3 years old and upwards, over 12, not exceeding 14 hands—in hand	5	3	2
65.	Stallion, 3 years old and upwards, 12 hands and under—in hand	5	3	2
66.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, over 13 and not over 14 hands—in saddle	5	3	2
67.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, over 12 and not over 13 hands—in saddle	5	3	2
68.	Yeld Mare, Filly, or Gelding, 3 years old and upwards, 12 hands and under—in saddle	5	3	2

President's Medal for best Pony.

50

Carry forward £690

¹ A Mare 6 years old or more must have had a living foal. Winners of the Hackney Society's £10 Prize or Gold Medal in 1904, except at the London and Royal English Shows, excluded. The winner must be entered or accepted for entry in Hackney Stud-Book, and certified free from hereditary disease. This Gold Medal is not redeemable.

Brought forward		...	...	£690
		Premiums.		
		1st.	2nd.	3rd.
		£	£	£
POLO AND RIDING PONIES.				
Class				
69.	Stallion, 3 years old and upwards, 13.2 and not exceeding 14.2 hands, entered in the Polo and Riding Pony Stud-Book, or got by a Registered Polo Pony sire or out of a Registered Polo Pony dam .	5	3	2
70.	Yeld Mare, Filly, or Gelding, 3 years old or upwards, 13.2 and not exceeding 14.2 hands, entered in the Polo and Riding Pony Stud-Book, or got by a Registered Polo Pony sire or out of a Registered Polo Pony dam .	5	3	2
<i>President's Medal for best Polo or Riding Pony.</i>				
				20

HIGHLAND PONIES.

71.	¹ Highland Pony Stallion, 3 years old or upwards, not exceeding 14.2 hands, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book .	5	3	2
72.	Highland Pony Entire Colts foaled in 1902 or 1903 .	5	3	2
	² Special Prize of £5, 5s. for best Stallion or Entire Colt in Classes 71 and 72.			
73.	Highland Pony Mare, 3 years old or upwards, not exceeding 14.2 hands, yeld or with foal at foot, entered or accepted for entry in the Highland Section of the Polo Pony Stud-Book .	5	3	2
	² Special Prize of £5, 5s. for best Mare in Class 73.			
<i>President's Medal for best Highland Pony.</i>				
				30

Carry forward £740

¹ Exhibitors desirous of entering in these Classes Ponies not yet accepted for entry in the Highland Section of the Polo Pony Stud-Book are recommended to communicate with Mr J. H. Munro Mackenzie of Calgary, Isle of Mull, who will advise as to the steps to be taken with a view to the registration of the Ponies. All entries for above Classes must be accompanied by a certificate, either from Mr Mackenzie or from Mr A. B. Charlton, Secretary to The Polo and Riding Pony Society, 12 Hanover Square, London, W., to the effect that the animals are entered or accepted for entry in the Highland Pony Section of the Polo Pony Stud-Book.

² Given by The Polo and Riding Pony Society.

Brought forward		...	...	£740
		Premiums.		
SHETLAND PONIES		1st.	2nd.	3rd.
<i>(All to be shown in hand.)</i>				
Class		£	£	£
74. Stallion, not exceeding 10½ hands, foaled before 1901		5	3	2
75. Entire Colt, not exceeding 10½ hands, foaled in 1901 or 1902		5	3	2
76. Mare, not exceeding 10½ hands, with foal at foot		5	3	2
77. Yeld Mare, not exceeding 10½ hands		5	3	2
78. Filly, not exceeding 10½ hands, foaled in 1901 or 1902		5	3	2
<i>President's Medal for best Shetland Pony.</i>				
				50

DRIVING COMPETITIONS.

79. Yeld Mare, Filly, or Gelding, in Harness, 15 hands and upwards, to be driven in the ring	20	10	5
80. Yeld Mare, Filly, or Gelding, in Harness, under 15 hands, to be driven in the ring	20	10	5

*President's Medal for best animal in the Classes for Horses in Harness.*¹

79

£860

JUMPING COMPETITIONS

SPECIAL REGULATIONS.

(See also the Regulations on pages 55 to 66.)

1. Jumping Competitions will take place on the afternoons of Wednesday, Thursday, and Friday, the 20th, 21st, and 22nd July.
2. Entries for each day's Competitions will close at the Secretary's Office in the Showyard at 6 P.M. on the preceding day.
3. Entry Fees.—Wednesday, £1; Thursday and Friday, 10s. for each class.
4. Accommodation for jumping horses will be provided as follows: Covered shed in which to stand during the day free of charge; or, on application to the Secretary not less than seven days before the opening of the Show, stalls or loose-boxes will be provided at a charge (in addition to the Entry Fee) of £1 for a stall, and £1, 10s. for a loose-box, which must be paid along with the Entry Fee at the time of application.

¹ An animal, that has won a President's Medal in another section in this Show shall not be eligible to compete for the Medal in this section.

5. Horses entered for jumping only need not enter the Showyard till 12 noon on the day of Competition, and may leave the Showyard at 6 p.m. each day.
6. *The Jumps* may consist of Single Hurdle, Gate, Double Hurdle, Wall, and Water Jump, power being reserved by the Society to alter these, as well as the Handicaps, as may be thought desirable.

WEDNESDAY.

WEDNESDAY.		1st.	2nd.	3rd.	4th.	5th.
Class		£	£	£	£	£
1. Horses or Ponies any height	.	20	15	10	5	3

THURSDAY.

2. Horses or Ponies any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in Class 1 10 8 5 3 2

FRIDAY.

- | | | | | | |
|---|----|---|---|---|---|
| 3. Horses or Ponies any height, Handicap, hurdles and gate being raised 8 inches for the winner of the first prize, and 4 inches for the winner of the second prize in either of Classes 1 or 2—4 inches extra for the winner of the two first prizes in Classes 1 and 2 | 10 | 8 | 5 | 3 | 2 |
| Champion Prize for most points in Prizes with one or more horses in above Classes—First Prize to count five points; Second Prize, four points; Third Prize, three points; Fourth Prize, two points; and Fifth Prize, one point—the money to be evenly divided in the event of a tie | 10 | — | — | — | — |

THURSDAY EVENING.

- | | | | | | | | | |
|---------------------------------|---|---|----|---|---|---|---|------|
| 4. Horses or Ponies any height. | . | . | 10 | 5 | 3 | 2 | — | #139 |
|---------------------------------|---|---|----|---|---|---|---|------|

SHEEP

		Premiums.			
BLACKFACED.		1st.	2nd.	3rd.	4th.
Class		£	£	£	£
81.	Tup above one shear . . .	12	8	4	2
82.	Shearling Tup . . .	12	8	4	2
83.	Ewe above one shear, with her Lamb at foot . . .	10	5	2	—
84.	Shearling Ewe or Gimmer . . .	10	5	2	—

President's Medal for best pen of Blackfaced Sheep.

Carry forward £86

¹ Given by the Cheviot Sheep Society

		Brought forward			£410		
		Premiums.					
		1st.	2nd.	3rd.			
SUFFOLK.		£	£	£			
Class							
103.	Shearling Tup	6	4	2			
104.	Shearling Ewe or Gimmer	5	3	2			
	¹ Best Suffolk Ewe in Class 104 bred in Scotland—£3; second best ditto, £2.						
105.	¹ Three Ewe Lambs, uncoloured and untrimmed, except as to the squaring of the tail—£5, £3, and £2.						
	¹ Best Pen of Suffolk Ewe Lambs in Class 105 bred in Scotland—£3; second best ditto, £2.						
	<i>President's Medal for best pen of Suffolk Sheep.</i>						22
FAT SHEEP.							
106.	² Three Fat Shearling Ewes or Wethers, out of Blackfaced Ewes, and got by Border Leicester or other Tup—£3, £2.						
107.	² Three Fat Shearling Cross-bred Ewes or Wethers out of Ewes of any breed other than Blackfaced, and got by Tup of a different breed from the Ewes—£3, £2.						
108.	Five Fat Lambs, any breed or cross, dropped in the year of the Show	5	3	—			
							8
							<u>£440</u>
	¹ Best pen of Lambs in Class 108 got by a Suffolk Tup, and out of Cheviot or Blackfaced Ewes—£5.						
	¹ Best pen of Lambs in Class 108 got by a Suffolk Tup, and out of Border Leicester, Half-bred, or Three-parts-bred Ewes—£5.						
	³ Best pens of Cross-bred Lambs in Class 108 got by an Oxford-Down Tup—£5, £3, and £2.						
	⁴ Best pens of Cross-bred Lambs in Class 108 got by a Shropshire Tup—£5, £3, and £2.						

SWINE

		Premiums.					
		1st.	2nd.	3rd.			
LARGE WHITE BREED.		£	£	£			
Class							
109.	Boar	6	4	2			
110.	Sow	6	4	2			
111.	Three Pigs, not above 8 months old	5	3	2			
	Carry forward						£34

¹ Given by the Suffolk Sheep Society. ² Per Mr W. S. Ferguson, Pictstonhill, Perth.³ Given by Oxford-Down Sheep-Breeders' Association.⁴ Given by Scotch Breeders of Shropshire Sheep.

Brought forward				£34
Premiums.				
WHITE BREED OTHER THAN LARGE.				
Class	1st.	2nd.	3rd.	
	£	£	£	
112. Boar	6	4	2	
113. Sow	6	4	2	
114. Three Pigs, not above 8 months old	5	3	2	
				34
BERKSHIRE.				
115. Boar	6	4	2	
116. Sow	6	4	2	
117. Three Pigs, not above 8 months old	5	3	2	
<i>President's Medal for best pen of Swine.</i>				34
				£102

EXTRA STOCK

Animals not included in the Classes for Competition may be exhibited as Extra Stock, and may receive Awards as follows:—Very Highly Commended, or Highly Commended, carrying the Medium Silver Medal, or Commended, for which the Bronze Medal is given.

Animals entered as Extra Stock are eligible to compete for the President's Medals, whether former winners of these Medals or not.

POULTRY

First Premium—ONE SOVEREIGN; *Second Premium*—TEN SHILLINGS. In each Class in which there are six or more entries, a Third Prize of Five Shillings may be awarded, provided there is sufficient merit in the pens. Three or more Commendations may also be given—thus, Very Highly Commended, Highly Commended, and Commended.

Champion Medals are offered as follows:—

- | | |
|--------------------------------|-------------------------|
| 1. Best Cock, any Variety. | 5. Best Pen of Ducks. |
| 2. Best Hen, any Variety. | 6. Best Pen of Geese. |
| 3. Best Cockerel, any Variety. | 7. Best Pen of Turkeys. |
| 4. Best Pullet, any Variety. | |

Aged Birds must have been hatched previous to, and Cockerels and Pullets in, the year of the Show.

DORKING—		Class	SCOTCH GREY		Class
<i>Coloured</i>		1. Cock			15. Cock
		2. Hen			16. Hen
		3. Cockerel			17. Cockerel
		4. Pullet			18. Pullet
<i>Silver Grey</i>		5. Cock	HAMBURG—		
		6. Hen	<i>Black</i>		19. Cock
		7. Cockerel			20. Hen
		8. Pullet	<i>Any other Variety</i>		21. Cock
COCHIN-CHINA		9. Cock			22. Hen
		10. Hen	<i>Any Variety</i>		23. Cockerel
BRAHMAPOOTRA		11. Cock			24. Pullet
		12. Hen	PLYMOUTH ROCK		25. Cock
BRAHMA or COCHIN		13. Cockerel			26. Hen
		14. Pullet			27. Cockerel
					28. Pullet

	Class		Class
MINORCA	29. Cock	BANTAM— <i>Game, any Variety, including Old English</i>	61. Cock
	30. Hen		62. Hen
	31. Cockerel	<i>Any other Variety</i>	
	32. Pullet	<i>Bantam</i>	63. Cock
LEGHORN—			64. Hen
<i>White</i>	33. Cock	ANY OTHER RECOGNISED	
	34. Hen	BREED OF POULTRY .	65. Cock
<i>Any other Variety</i>	35. Cock		66. Hen
	36. Hen		67. Cockerel
<i>Any Variety</i>	37. Cockerel		68. Pullet
	38. Pullet		
LANGSHAN	39. Cock	TABLE FOWLS—	
	40. Hen	<i>Any Breed or Cross, to be judged solely as Table Fowls, and without regard to fancy points</i>	69. { Pair of Cockerels
ORPINGTON	41. Cock		70. { Pair of Pullets
	42. Hen		
LANGSHAN OR ORPINGTON	43. Cockerel		
	44. Pullet		
WYANDOTTE—		DUCKS—	
<i>Gold or Silver</i>	45. Cock	<i>Aylesbury</i>	71. Drake
	46. Hen		72. Duck
<i>Any other Variety</i>	47. Cock		73. { Drake (Young)
	48. Hen		74. { Duck (Young)
<i>Any Variety</i>	49. Cockerel	<i>Rouen</i>	75. Drake
	50. Pullet		76. Duck
INDIAN GAME	51. Cock	<i>Any other Variety</i>	77. Drake
	52. Hen		78. Duck
	53. Cockerel		
	54. Pullet	DUCKS—	
GAME—		<i>Any Breed (Aylesbury excepted)</i>	79. { Drake (Young)
<i>Old English</i>	55. Cock		80. { Duck (Young)
	56. Hen	GEESSE	81. Gander
<i>Modern</i>	57. Cock		82. Goose
	58. Hen	TURKEYS	83. Cock
GAME—			84. Hen
<i>Any Variety, not including Indian</i>	59. Cockerel		
	60. Pullet		

Amount of Poultry Premiums, £143, 10s.

DAIRY PRODUCE

No Exhibitor to show more than one lot in any Class.

Class	Premiums.			
	1st.	2nd.	3rd.	
1. Powdered Butter, not less than 7 lb.	£	£	£	
2. Fresh Butter, three 1-lb. rolls	4	2	1	
	4	2	1	
3. Cheddar Cheese, 56 lb. and upwards—£6, £4, £2, £1,				£14
4. Cheese, 14 lb. and under—£3, £2, £1.				18
				6
				£33

ABSTRACT OF PREMIUMS.

(24 Champion Medals given by THE EARL OF MANFIELD.)

GIVEN BY THE SOCIETY.

1. Cattle	£818	0	0
2. Horses	860	0	0
3. Jumping	139	0	0
4. Sheep	440	0	0
5. Swine	102	0	0
6. Poultry	143	10	0
7. Dairy Produce	33	0	0
8. Medals to Breeders, &c.	20	0	0
9. Prizes for Timber ¹	20	0	0
	<hr/>		
	£2575	10	0

CONTRIBUTED PRIZES.

1. The Shorthorn Society	£50	0	0
2. Sir George Macpherson Grant, Bart.	50	0	0
3. The late Mr C. Macpherson Grant of Drumduan	50	0	0
4. Polled Cattle Society	10	0	0
5. Ayrshire Cattle Herd-Book Society	20	0	0
6. Cawdor Challenge Cups	105	0	0
7. Bequest by late Miss Murdoch	10	0	0
8. Sir John Gilmour, Bart.	25	0	0
9. Hunters' Improvement Society	10	10	0
10. Captain Clayhills Henderson	27	0	0
11. Hackney Horse Society	10	0	0
12. Polo and Riding Pony Society	10	10	0
13. Cheviot Sheep Society	25	0	0
14. Oxford-Down Sheep-Breeders' Association	10	0	0
15. Suffolk Sheep Society	30	0	0
16. Per Mr W. S. Ferguson	10	0	0
17. Scotch Breeders of Shropshire Sheep	10	0	0
18. Tweeddale Gold Medal	20	0	0
	<hr/>		
	483	0	0
	<hr/>		
	£3058	10	0
	<hr/>		

¹ Grant to Royal Scottish Arboricultural Society for Prizes for Timber.JAMES MACDONALD, *Secretary*.3 GEORGE IV. BRIDGE,
EDINBURGH, *February 1904.*

The Society's Show for 1905 will be held at
Glasgow.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN FEBRUARY 1903.

ARRANGED ACCORDING TO SHOW DISTRICTS.

ELECTED JUNE 3, 1903, AND JANUARY 13, 1904.

1.—GLASGOW DISTRICT.

ARGYLL.

Admitted

- 1903 Aldam, W. Wardie, of Ederline, Ford
1903 Mitchell, John, Killinnochonoch, Loch-
gilphead
1903 Struthers, Arch., Dunolliebeg, Oban
1903 Weir, John, Invernell, Airdrishaig

AYR.

- 1903 Beavan, Jim, Eglinton Kennels, Kil-
winning
1903 Donald, John H., Sornbeg, Galston
1904 Dunlop, Quintin, jun., Greenan, Ayr
1903 Hamilton, James, Langmuir House, Kil-
maurs
1903 Hunter, Arch., Implement Works, May-
bole
1903 Middleton, James, Estate Office, Brae-
head, Kilmarnock
1904 Neil, John, Barleith, Huriford, Ayrshire
1903 Smith, John, Kilmaurs Mains, Kilmaurs
1904 Turner, Fred. John, jun., Cessnock,
Galston
1903 Young, Alex., Muirhouse, Crosshouse,
Kilmarnock

BUTE.

- 1903 Bute, Marquis of, Mount Stuart, Rothe-
say

LANARK.

- 1903 Alexander, James Y., 19 Hope Street,
Glasgow
1903 Barr, James, British Linen Co. Bank,
Carlisle
1903 Cross, Wm. C., 19 Hope Street, Glasgow
1903 Findlater, George, Jerviswood Mains,
Lanark
1903 Forrest, John, Brewshott, Carnwath
1903 Harper, P. Rankin, Permanent Nitrate
Committee, 101 West George Street,
Glasgow
1903 Johnston, George, jun., Potato Merchant,
Airdrie
1903 MacArthur, D. A., Nunnerie, Abington
1903 Muir, John, Townhead, Libberton, Carn-
wath
1904 Munro, John M., The Grange, Maxwell
Park, Glasgow
1903 Murray, T. B., Spittal, Biggar
1903 Pooley, John S., 25 South Kinning Place,
Glasgow
1904 Stewart, David, Blantyre Park, High
Blantyre

RENFREW.

- 1904 Mather, James B., Kirkhill, Newton
Mearns

2.—PERTH DISTRICT.

FIFE.

- 1904 Allan, David, South Ford, Dunfermline
1903 Ballingall, George, Newton, Wormit,
Dundee
1904 Cairns, William Roger, Ashburn House,
Crail
1903 Henderson, Wm., Reedieleys, Auchter-
muchty
1903 Lawson, John, of Carriston, Markinch
1904 Lyle, Alex., Auchmudy Farm, Markinch
1903 Maclellan, George J., of Kinsleith,
Cupar-Fife

- 1903 Maclellan, Walter P., of Kinsleith,
Cupar-Fife
1903 Mungall, William, Transy, Dunferm-
line
1904 Stewart, James, Clatto, Ladybank
1904 Stewart, John, Struthers Barns, Cupar-
Fife
1904 Thomson, Major Wm. St C. Anstruther,
of Kilmany, Cupar-Fife
1904 Watson, Henry, National Bank Build-
ings, Anstruther
1903 Wilson, George A., East Colquhally,
Lochgelly

FORFAR.

(PERTH SHOW DIVISION.)

- 1903 Bell, John C., Auchtertyre, Newtyle
 1903 Stuart-Gray, Hon. M. G., of Kinnaird,
 Gray House, Dundee
 1903 Thom, William L., Benzie, Dundee

PERTH.

(PERTH SHOW DIVISION.)

- 1903 Cameron, John, Ballanloan, Blair-Atholl
 1904 Doe, George B., Errol Implement Depot,
 Errol

- 1904 Ferrusson, Andrew Mitchell, Banker,
 Alyth
 1904 Grindon, John, Oakbank, Blairgowrie
 1903 Haggart, James D., Breadalbane Mills,
 Aberfeldy
 1903 Inglis, Robert, Assistant Factor, Blair-
 Atholl
 1903 Mitchell, David, Royal Bank, Blair-
 gowrie
 1904 Noie - Miller, Francis, of Clovee,
 Perth
 1904 Ritchie, James, Whitefield, Coupar-
 Angus
 1903 Tullibardine, Marquis of, M.V.O., D.S.O.,
 Dunkeld House, Dunkeld
 1904 White, Charles D., Guardswell, Inch-
 ture

3.—STIRLING DISTRICT.**DUMBARTON.**

- 1904 Burns, Alan, Cumbernauld House, Cum-
 bernauld, Glasgow
 1903 Currie, Malcolm, Stubblebroomhill,
 Kirkintilloch

PERTH.

(STIRLING SHOW DIVISION.)

- 1903 Barry, Alex. Boyd, I.L.B., Solicitor,
 Dunblane
 1903 Ferguson, John, Auchinmer, Comrie

- 1903 Johnston, Robert, jun., Laverockland,
 Muthill
 1904 Turner, Joseph, of Greenhill, Green-
 loaning

STIRLING.

- 1903 Maclean, Donald, Peatriggend House,
 Slamannan
 1903 Mitchell, Arch., Waterslap, Larbert
 1904 Stewart, D. Y., Balgrochan, Torrance
 1903 Murray, James, Munnieson, Thornhill,
 Stirling
 1904 Thornley, Thomas, Camelon Works,
 Falkirk
 1903 Walls, James, Muirton, Stirling

4.—EDINBURGH DISTRICT.**EDINBURGH.**

- 1904 Darling, Robert, Remote, Dalkeith
 1903 Dickson, Leonard W., 6 Gloucester Place
 1903 Hunter, Frank, W.S., 7 York Place
 1903 Jack, Alex., Brunstane Mills, Mussel-
 burgh
 1903 Kinnear, Norman Boyd, 12 Grosvenor
 Crescent
 1903 Martin, John, Letham, Midcalders
 1903 Morrison, James, 18 George Street
 1904 Scott, John, 42 Braid Crescent
 1903 Sinclair, George, Home Farm, Dalmeny
 Park, Edinburgh

HADDINGTON.

- 1903 Mackie, Alex. Kirk, Setonhill, Long-
 niddry

LINLITHGOW.

- 1903 Amour, Harry, Niddry Main, Winch-
 burgh
 1903 Brown, William, Vellere, Polmont
 Station

5.—ABERDEEN DISTRICT.**ABERDEEN.**

- 1904 Findlay, I. D., 343 Union Street, Aber-
 deen
 1904 Florence, Alexander, Knowley, Rayne,
 Warrle
 1903 Gordon, Alex., Theodore, yr. of Newton,
 Inch
 1904 Grant, Robert, Pitfichie, Monymusk
 1903 Hunter, Stephen, Northern Agricultural
 Co., Aberdeen
 1904 M'Robert, A. T., Aberdeen Lime Co.,
 Aberdeen
 1904 Milne, Colonel George, Logie Elphinstone

BANFF.

- 1903 Kynoch, John, W. Isla Bank, Keith

FORFAR.

(ABERDEEN SHOW DIVISION.)

- 1903 Fraser, Major J. W., Forebank House,
 Brechin
 1904 Stewart, Donald, Chellwood, Monifieth

KINCARDINE.

- 1903 Ireland, Edwin, Ramsay Arms Hotel,
 Petteccairn

6.—DUMFRIES DISTRICT.

DUMFRIES.

- 1904 Annandale, Wm. Edwin, Hopsrigg, Langholm
 1903 Barbour, John, Bengall, Lockerbie
 1903 Beattie, Thos., Dumfelling, Langholm
 1903 Bell, James, Frydekirk Mains, Annan
 1903 Bell, John, Torbeckhill, Ecclefechan
 1903 Borthwick, A. Hay, Billholm, Langholm
 1903 Brown, James, Shillerhill, Lockerbie
 1904 Butler, Peter, Atholl Bank, Noblehill, Dumfries
 1903 Byers, James, Gimmenbie Mains, Lockerbie
 1903 Campbell, Dr Robert B., Orichton Royal Institution, Dumfries
 1903 Carlyle, Thos. R., Waterbeck, Ecclefechan
 1903 Chapman, Andrew, Dinwoodie Lodge, Lockerbie
 1903 Charlton, John, Loreburn Park, Dumfries
 1903 Clark, A. M., Hoddon Estates Office, Ecclefechan
 1903 Cowan, Ronald L., Hailguards, Ecclefechan
 1903 Orichton, D. W., Limekilns Farm, Annan
 1903 Crosbie, John, Chapelhill, Carlaverock, Dumfries
 1903 Dalgleish, Robert, Ulzie-side, Sanguhar
 1903 Dickie, David, Tower, Sanguhar
 1903 Donaldson, Thomas, Sarkshields, Ecclefechan
 1903 Easton, John, Brownfield, Dumfries
 1904 Fleming, John, Crowdieknowe, Ecclefechan
 1903 Gilson, Adam Kennedy, Springkell, Ecclefechan
 1904 Gibson, John, Bruntshields, Lochmaben
 1904 Gibson, Samuel, Summerfield, Dumfries
 1904 Gibson, Thomas, Auchencrief, Dumfries
 1903 Gladstone, Stuart, of Capenoch, Thornhill
 1903 Graham, Thomas, Marchfield, Dumfries
 1904 Irving, Francis, Pennersaugh, Ecclefechan
 1903 Johnson-Ferguson, A., yr. of Springkell, Ecclefechan
 1903 Johnson-Ferguson, J. E., of Springkell, Ecclefechan
 1903 Kennedy, Wm., Luce Mains, Ecclefechan
 1903 Laurie, C. V. E., yr. of Maxwellton, Monnave
 1903 Mcintosh, Duncan, West Mains, Dumfries
 1903 Mathews, Robert, The Linns, Torthorwald, Dumfries
 1904 Milligan, Samuel, M.A., B.Sc., Hayfield, Thornhill
 1903 Morton, Hugh, Dalmakethar, Lockerbie
 1904 Oswald, Major Julian, Watch Hill, Canonbie
 1903 Paterson, Robert, Holms, Beattock
 1903 Pickering, R. Y., of Conleath, Dumfries
 1903 Rae, David, Broom, Annan
 1903 Rogerson, James, Saughtrees, Wumphray, Beattock
 1903 Rogerson, John K., Jean Villa, Lovers' Walk, Dumfries
 1903 Scrimgeour, James, Mainholm, Hoddon, Ecclefechan
 1903 Symington, Arch., of Allanton, Auld-girth
 1903 Tayleur, Eric, Newton, Dumfries

- 1903 Urquhart, James II., Eaglesfield, Ecclefechan
 1904 Veitch, George Douglas, of Ellick, Sanguhar
 1903 Williamson, Thomas, Drumbuc, Sanguhar
 1903 Wylie, James, Bankhead, Lochmaben
 1903 Wylie, James, Whitehill, Sanguhar
 1904 Young, Robert, Hardgrove, Rutliwell, R.S.O.

KIRKCUDBRIGHT.

- 1904 Armstrong, Robert, Littleton, Gatehouse
 1903 Baird, George, Netherplace, Dalbeattie
 1903 Bone, James, Lochvale, Castle-Douglas
 1903 Brown, James, of Barlay, New Galloway (32 Moay Place, Edinburgh)
 1903 Brown, James, of Knockbrex, Kirkcudbright (Longfield, Heaton Mersey, Manchester)
 1903 Brown, William, of Netherlaw, Kirkcudbright
 1903 Brown, J. H. Balfour, Goldielea, Dumfries
 1903 Campbell, Wm. George, High Borgue, Tynholm, Castle-Douglas
 1903 Coats, W. A., of Dalskairth, Dumfries
 1903 Cochran, Captain William, Torrorie, Preston Mill, Kirkbean, Dumfries
 1903 Cochran, William, jun., Torrorie, Preston Mill, Kirkbean, Dumfries
 1903 Craigie, John, Farmer, Creetown
 1903 Fairhurst, Thomas, of Borness, Kirkcudbright (Kilhey Court, Worthington, near Wigau)
 1904 Gibson, John, Priestlands, Troqueer, Dumfries
 1903 Gordon, Col. Wm., of Threave, Castle-Douglas
 1904 Graham, John, Kirkconnell, Ringford
 1903 Hacking, J. H., Auchengibbert, Crocksford, Dalbeattie
 1903 Ramsay, Col. Ramsay Wm. Ramsford, of Kirkdale, Creetown
 1904 McKerrow, Chas. Samson, Boreland of Southwick, Dumfries
 1903 Maxwell, W. J., yr. of Munches, Dalbeattie
 1903 Milligan, J. E., Solicitor, Dalbeattie
 1903 Parker, Hugh, Boreland, Castle-Douglas
 1903 Robb, Thomas, Sheep-icaler, Castle-Douglas
 1903 Slater, Andrew, Hartburn, Kirkcudbright
 1903 Sloan, William, Larg Farm, Creetown
 1903 Wilkinson, H. Bevis, St. Mary's Isle Estates Office, Kirkcudbright
 1903 Witham, Lieut.-Col. J. Maxwell, Kirkconnell, New Abbey, Dumfries
 1903 Yrburgh, R., M.P., Barwhillanty, Par-ton, R.S.O.
 1903 Young, John, Brockloch, Dalbeattie

WIGTOWN.

- 1903 Adair, Percy J., Solicitor, Stranraer
 1903 Agnew, John Lockhart, Balwherrrie, Lewalt
 1903 Barbour, John, Balgown, Ardwell, Stranraer
 1903 Chalmers, Hugh, Chleury, Castle-Kennedy

- | | |
|---|---|
| 1903 Cochran, Andrew, High Ardwell, Kirkcolum | 1904 M'Donnall, Nigel Douglas, Logan, Stranraer |
| 1903 Craig, John, Greyhill, Stoneykirk | 1903 M'Guffie, P. D., Craighlenina, Whithorn |
| 1903 Dunbar, Lt.-Col. Robert Lennox Nugent, of Machermore, Newton-Stewart | 1904 Mackeand, A. W., M.R.C.V.S., Port William |
| 1903 Findlay, John Steel, Drumbredan, Ardwell, Stranraer | 1903 Parker, John, Balyett, Stranraer |
| 1903 Findlay, Wm., Drumbredan, Ardwell, Stranraer | 1903 Parker, William, Inchparks, Stranraer |
| 1903 Forsyth, John, Wallyfield, Kirkcolum | 1903 Rain, William, South Balern, Kirkinner |
| 1904 Gillon, Andrew, Glasserton | 1903 Routledge, Joseph, Barsalloch, Castle William |
| 1903 Hamilton, Hugh, jun., 7 Bridge Street, Stranraer | 1903 Smith, George, Dunskey, Port Patrick |
| 1903 Hamilton, James, Penkiln, Garliestown | 1904 Sproat, Wm., North Balern, Kirkinner |
| 1903 Hamilton, Captain Wm. M. Fleming, of Craighlaw, Kirkcowan | 1904 Stair, the Earl of, Lochinch, Castle Kennedy Station |
| 1903 Lamb, Robert, Gallowhill, Stranraer | 1903 Walker, H. H., Monreith Estate Office, Whauphill |
| 1903 M'Camon, John, Barnhills, Kirkcolum | 1903 Williams, E. H. Lawson, Holm of Bargrennan, Newton-Stewart |

7.—INVERNESS DISTRICT.

ELGIN.

- 1904 Gregory, Alex. Macdonald, Maryhill, Elgin
 1904 Hogg, Alex., County Road Surveyor, Elgin
 1903 Robertson, Wm. Brown, jun., Coleburn, Longmorn, R.S.O.

INVERNESS.

- 1903 MacBean, Malcolm Rae, Milton of Congnage, Gollanfield
 1903 Mackenzie, John Blair, Estates Office, Fort-William
 1903 Mackintosh, Hugh, Rose Valley, Gollanfield
 1904 Reid, George, Tamdhu Distillery, Dalbeallie, Strathspey

ORKNEY AND SHETLAND

- 1904 Miller, John Charles, Banker, Kirkwall

ROSS AND CROMARTY.

- 1903 Budge, John Henry, Brucefield, Portmahomack
 1903 Douglas, George, Seafeld, Portmahomack
 1904 Fowler, Alex., Drumore, Munlochry
 1903 Fraser, Roderick, Udale, Poyntzfield, Invergordon
 1903 Gill, Thomas Douglas, Easter Ardross, Ainess
 1903 Hope, Stephen Jervis, Meikle Tarrel, Fearn
 1903 Mackenzie, Charles, British Linen Co. Bank, Tain
 1903 Middleton, Thomas, Cornatown, Canon Bridge
 1904 Munro, Alex., Newton of Novar, Evanton

8.—BORDER DISTRICT.

BERWICK.

- 1903 Mitchell-Innes, A. Harold, of Whitehill Chirnside

ROXBURGH.

- 1903 Brownlee, John, Smailholm Mains, Kelso

- 1903 Elliot, Wm. Irving, Kirndeane, Newcastleton
 1904 MacLagan, Norman, Courthill, Kelso
 1904 Roberts, T. J. Esq., Drygrange, Melrose
 1903 Rutherford, Walter, Crailing Tofts, Roxburgh

ENGLAND.

- | | |
|---|---|
| 1903 Angus, William, B.Sc., Glenthorne, Hope Park, Chelmsford | 1903 Howard, Henry Charles, Greystoke Castle, Penrith |
| 1903 Burlingame, C. H. (M'Cormick & Co.), 71 Southwark Street, London, S.E. | 1903 Montgomery, Hugh, 8 Fenwick Street, Liverpool |
| 1903 Creighton, T. R. (Thos. Reay), Abbey Town, Carlisle | 1903 Shephard-Walwyn, J. Esq., Estates Office, Corby Castle, Carlisle |
| 1903 Fleming, James, Redkirk, Rigg, Carlisle | |

IRELAND.

1904 Blam Hume, Killybegs, Grystones, Ireland

WINNER OF FIRST-CLASS CERTIFICATE IN FORESTRY,
ELECTED A FREE LIFE MEMBER.

1906 Scott, Frank, Duffries House Mains, Cannock

HONORARY MEMBERS.

- | | |
|---|--|
| 1908 Clarke, Sir Ernest, Secretary, Royal
Agricultural Society of England, 18
Hanover Square, London, W
1908 Ewart, Professor J. Cosser, M D
F R S, University, Edinburgh
1908 Oulvie, F. Grant, M A, Assistant Secre-
tary, Board of Education, London | 1908 Plunket, Right Hon Sir Horace, F R S
Department of Agriculture and Tech-
nical Instruction Dublin
1908 Warington, R., F R S, High Bank,
Harpenden, Herts. |
|---|--|

FOREIGN ASSOCIATES.

- 1908 Bang, Professor B., Copenhagen
 1908 Saunders, Dr Wm., Director, Central Experimental Farm Ottawa Canada
 1908 Stebler, Dr F. G., Zurich Switzerland

Number of Members in Last published in February 1906.	6282
Number of Members admitted in June 1908	176
Number of Members admitted in January 1904	61
Certificate Holder admitted in June 1908	1
Honorary Members	5
Foreign Associates	9
	<hr/>
Deduct estimated deaths &c	6528
	150
	<hr/>
Total	1378

INDEX

- Accounts—see Finance.
- Agricultural Education: Report to General Meeting, 461.
- Agricultural Experiments, Review of, by Dr A. P. Aitken, 143.
- Agricultural Statistics, 361.
- Agriculture, Board of, Correspondents for, 455.
- Agriculture, National Diploma in, Syllabus of Examination, Appendix B, 11.
- Aitken, Dr A. P.: Review of Agricultural Experiments, 143.
- Anthrax, by Professor John Dunstan, 75.
- Argyll Naval Fund: Mr Patten Macdougall appointed to Committee, 452—Abstract of Accounts, 442—Report to General Meeting, 465.
- Barley, Price of Home-Grown, in the Edinburgh Market for 1903, 375.
- Barns Graham, Allan, jun.: The Influence of Food on Milk, 43.
- Beans, Price of Home-Grown, in the Edinburgh Market for 1903, 379.
- Blackfaced Sheep, Clipping of, Proceedings, in regard to, 447.
- Board of Agriculture, Correspondents for, 455.
- Botanical Department: Report to General Meeting, 461; Appendix B, 36.
- Breach of Show Regulation, Proceedings in regard to, 452, 455.
- Buchan, Dr Alex.: Meteorology of 1903, 350.
- Burning Heather, by James Cameron, 10.
- Bye-Law, Infraction of, 452.
- Cameron, James: The Practice of Heather-Burning, 10.
- Cattle-Vans, Scottish Railways regarding the use of, 446.
- Cereal and other Grain Crops of Scotland for 1903, and Meteorology of the Year relating thereto, 326.
- Charter, New, Proceedings in regard to, 450, 462, 466.
- Charters, Royal, granted to the Society, Appendix A, 1.
- Chemical Department, Appendix B, 29.
- Clipping Blackfaced Sheep, Proceedings in regard to, 447.
- Collector, Hay, by John Speir, 1.
- Committees for 1903-1904, Appendix, 7.
- Correspondents for Board of Agriculture, 455.
- Cottages and Gardens: Premiums awarded in 1903, 436—Premiums offered in 1904, Appendix B, 50.
- Crops, Cereal and other, of Scotland for 1903, 326.
- Crowther, Milk Investigations at Garforth, 1903, 268.
- Dairy Department, Appendix B, 25.
- Dairy Diploma, Report of Examinations, 463—Syllabus, Appendix B, 25.
- Depopulation, Rural, in Scotland, by John W. Paterson, 21.
- Diploma, National, in Agriculture, Syllabus, Appendix B, 11.
- Directors and other Office-Bearers for 1903-1904, Appendix B, 5.
- District Competitions, Grant to Joint Show at Dingwall, 449—Premiums awarded in 1903, 436—Report to General Meeting, 467—Premiums offered in 1904, Appendix B, 41.
- Duchess of Sutherland's School, Grant to, 457.
- Dumfries Show, 1903, Report on, 335—Premiums awarded at, 405—List of Judges, 436—Abstract of Accounts, 440—Proceedings in regard to, 445, 447, 448, 449, 451, 453, 456—General Meeting of Members, 463—Reports to General Meetings, 460, 466.
- Dunstan, Professor John, On Anthrax, 75.
- Edinburgh and East of Scotland Agricultural College, donation to, 458.
- Edinburgh Corn-Market Grain Tables for Wheat, Barley, Oats, and Beans, 374.
- Education: Report to General Meeting, 463.
- Education of Shepherds' Families, Proceedings in regard to, 449, 450.

- Entomological Department, Appendix B, 37.
- Essays and Reports, Premiums offered for, in 1904, Appendix B, 38.
- Ewart, J. Cossar: The Multiple Origin of Horses and Ponies, 230.
- Experiment on Grass Land, Proceedings in regard to, 458.
- Experiments, Review of Agricultural, by Dr A. P. Aitken, 143.
- Farmers, Poultry-Keeping for, by Alex. M. Prain, 62.
- Farming, Methods of, in Perth Show District, 92.
- Fertility in Sheep, by Francis H. A. Marshall, 34.
- Fertilisers and Feeding Stuffs Act, Proceedings in regard to, 455.
- Finance: Accounts for 1902-1903, 437—Abstract of the Accounts of the Dumfries Show, 1903, 440—Abstract of the Accounts of the Argyll Naval Fund, 442—Report to General Meeting, 465.
- Fiscal Question, motion by Mr Ralston, 467.
- Fly, Sheep Maggot-, by Professor Stewart MacDougall, 128.
- Food, The Influence of, on Milk, by Allan Barns Graham, jun., 43.
- Forestry Chair, Grant to Lecturer, 459, 468.
- Forestry Department: Report to General Meeting, 461—Syllabus of Examination, Appendix B, 18.
- Garforth, Milk Investigations at, 1903, by Charles Crowther, 268.
- Gibb, Dr Shirra, Award of Gold Medal to, 449.
- Glasgow Show, 1905, Proceedings in regard to, 449, 450, 451, 454, 457, 458, 461, 466.
- Grain, Prices of, in Edinburgh Market for 1903, 374.
- Grant, A. S.: Methods of Farming in Perth Show District, 92.
- Grass Land, Experiment on, Proceedings in regard to, 458.
- Hay Collector, by John Speir, 1.
- Hay, James, Resolution on his death, 447.
- Heather-Burning, Practice of, by James Cameron, 10.
- Highland and Agricultural Society: Proceedings at Board and General Meetings, 445—Royal Charters granted to, Appendix A, 1—Constitution and Management, Appendix B, 3—Privileges of Members, Appendix B, 4—Establishment for 1903-1904, Appendix B, 5—Committees for 1903-1904, Appendix B, 7—Meetings, Appendix B, 9.
- Honorary Members, Proceedings in regard to election of, 450.
- Horses and Ponies, The Multiple Origin of, by J. Cossar Ewart, 230.
- Influence of Food on Milk, by Allan Barns Graham, jun., 43.
- Investigations, Milk, at Garforth, 1903, by Charles Crowther, 268.
- Johnston, L. of Sands, motion as to selection of Judges, 464.
- Judges, Regulations for the appointment of, 459—motion by Mr Johnston as to selection of, 464.
- Kilmarnock Dairy School, Grant to, 459, 468.
- King, H.M. The, Address to, 449.
- MacDougall, J. Patten, appointed to Argyll Naval Fund Committee, 452.
- MacDougall, Professor Stewart: The Sheep Maggot-Fly, 128.
- Maggot-Fly, The Sheep, by Professor Stewart MacDougall, 128.
- Mansfield, Earl of, elected Chairman of the Board, 453.
- Marshall, Francis H. A.: Fertility in Sheep, 34.
- Menzies, Sir Robert, Resolution on his death, 449.
- Meteorology of 1903, by Dr Buchan, 350.
- Methods of Farming in Perth Show District, by A. S. Grant, 92.
- Milk, Selling Separated, for Adulteration, motion by Mr Speir, 457.
- Milk, The Influence of Food on, by Allan Barns Graham, jun., 43.
- Milk Investigations at Garforth, 1903, by Charles Crowther, 268.
- Milk Records, by John Speir, 170.
- Milk Record Scheme, Proceedings in regard to, 448, 450, 455.
- Motor Car Traffic, Proceedings in regard to, 452, 462, 464.
- Multiple Origin of Horses and Ponies, by J. Cossar Ewart, 230.
- National Agricultural Examination Board, Proceedings in regard to, 457.
- National Diploma in Agriculture, Proceedings in regard to, 452—Syllabus, Appendix B, 11.
- New Charter, Proceedings in regard to, 450, 462, 466.
- New Members, Appendix B, 81.
- Nomination of Directors by Show Districts, Dates of Meetings for, Appendix B, 10.
- Oats, Prices of Home-Grown, in Edinburgh Market for 1903, 377.
- Office-Bearers of the Society, Election of, 460—List of, Appendix B, 5.
- On Anthrax, by Professor John Dunstan, 75.
- Onslow, Earl of, at Dumfries Meeting, 463.
- Paterson, John W.: Rural Depopulation in Scotland, 21.
- Perth County Divisions, naming of, 451.

- Perth Show District, Methods of Farming in, by A. S. Grant, 92.
- Perth Show, 1904, Proceedings in regard to, 453, 456, 458, 461, 466—Premiums offered at, Appendix B, 54.
- Ponies, The Multiple Origin of Horses and, by J. Cossar Ewart, 230.
- Ploughing Competitions in 1902-1903, 436—Regulations for, Appendix B, 49.
- Pony Stallions, height of, Proceedings in regard to, 449.
- Poultry-Keeping for Farmers, by Alex. M. Prain, 62.
- Practice of Heather-Burning, by James Cameron, 10.
- Prain, Alex. M.: Poultry-Keeping for Farmers, 62.
- Premiums awarded in 1903, 405—Offered in 1904, Appendix B, 38.
- Prices of Home-Grown Wheat, Barley, Oats, and Beans in the Edinburgh Market for 1903, 374.
- Prices of Sheep since 1818, 381.
- Prices of Wool since 1818, 383.
- Proceedings at Board and General Meetings, 445.
- Publications, Proceedings in regard to, 468.
- Railway Rates for Conveying Cattle in Horse Boxes, Proceedings in regard to, 456.
- Ralston, G. W., The Fiscal Question, 467.
- Raw Grain as Malt Whisky, Proceedings in regard to, 455.
- Records, Milk, by John Speir, 170.
- Review of Agricultural Experiments, by Dr A. P. Aitken, 143.
- Richmond and Gordon, Duke of, Resolution on his death, 453.
- Royal Charters granted to the Society, Appendix A, 1.
- Royal Scottish Arboricultural Society, Jubilee of, 457.
- Rural Depopulation in Scotland, by John W. Paterson, 21.
- Science Department, Reports to General Meetings, 461, 467.
- Scotland, Rural Depopulation in, by John W. Paterson, 21.
- Seeds, Testing, Proceedings in regard to, 447.
- Separated Milk for Adulteration, Proceedings in regard to, 457.
- Sheep, Blackface, Proceedings in regard to Clipping of, 447.
- Sheep Dipping Committee, Proceedings in regard to, 451, 452, 456.
- Sheep, Fertility in, by Francis H. A. Marshall, 34.
- Sheep Maggot-Fly, by Professor Stewart MacDougall, 128.
- Sheep, Prices of, since 1818, 381.
- Shepherds' Families, Education of, Proceedings in regard to, 449, 450.
- Show of 1906, Proceedings in regard to, 457, 458, 466.
- Showyard Regulations, Breach of, Proceedings in regard to, 452, 455.
- Speir, John: Hay Collector, 1—Milk Records, 170.
- Stair, Earl of, Resolution on his death, 458.
- Statistics, Agricultural, 361.
- Stewart, Sir Michael Shaw, Resolution on his death, 458.
- St Louis International Exhibition, Forestry Exhibition at, 452.
- Sutherland, Duchess of, School at Golspie, grant to, 457.
- Testing Seeds, Proceedings in regard to, 447.
- The Multiple Origin of Horses and Ponies, by J. Cossar Ewart, 230.
- Tuberculosis Experiments, Proceedings in regard to, 447.
- Turnip Lifters, proposed Trial of, 446, 448—Trial postponed, 458.
- Vans, Cattle, Proceedings in regard to, 446.
- Veterinary Department: Medals to Students, 436; Appendix B, 18.
- Wheat, Prices of Home-Grown, in the Edinburgh Market for 1903, 374.
- Whisky, Selling Raw Grain as Malt, 455.
- Wool, Prices of, since 1818, 383.

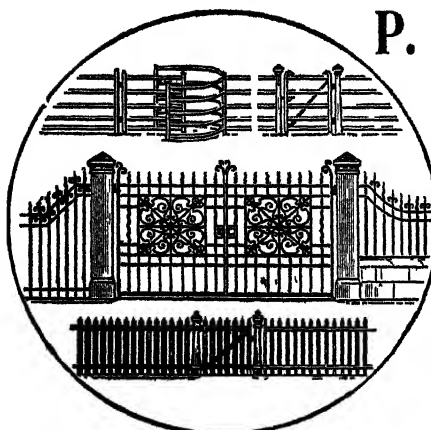
ADVERTISING SHEET.

P. & R. Fleming & Co.,

Fencing Contractors,

AND MAKERS OF ALL KINDS OF
WIRE, BAR, and ORNAMENTAL
FENCING GATES, RAILINGS,
&c.

*Erectors of Corrugated Iron
Hay Sheds, Cottages, Farm
Buildings, &c.*



AGRICULTURAL IMPLEMENTS

of all kinds by the best Makers.

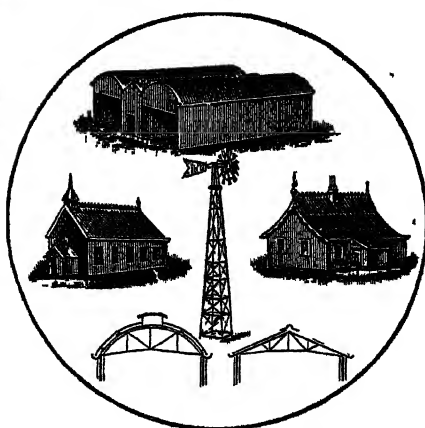
Agents for Ransome's Ploughs, Hay
Rakes, and Potato Diggers; Harrison
and M'Gregor's famous Mowers,
Reapers, and Binders.

Martin's Prize Cultivators.

**Fleming's
Charlock and Potato Sprayer.**

**Fleming's
Patent Horse Fork or Elevator.**

**Fleming's Patent Rick
Lifter.**



THRASHING MILLS, &c.

WINDMILLS.

The "IMPERIAL," and
"STEEL KING."

The "Imperial" was the winner of
the First Prize in the 1803 Trials of
the Royal Agricultural Society in Lon-
don open to all comers. The water
pumped exceeding the Second Prize
by more than double the quantity.
Specially commended for excellence
of design, efficiency in pumping, and
economy in upkeep.



**29 ARGYLE STREET,
AND**

**16 GRAHAM SQUARE,
GLASGOW.**

Agent for Hornsby's Oil Engine.

THE HORSE, CARRIAGE, & GENERAL INSURANCE CO., LIMITED

(THE OLDEST AND LARGEST OFFICE OF ITS KIND IN THE KINGDOM),

CHIEF OFFICE—17 QUEEN VICTORIA STREET, LONDON,

INSURE AT MODERATE PREMIUMS

HORSES and CATTLE against DEATH from ACCIDENT or DISEASE.

SPECIAL RATES for BROOD MARES and FOALS, and REDUCED RATES for STALLIONS.

CARRIAGES and other Vehicles against STREET and ROAD Accidents; and
THIRD PARTY INDEMNITY RISKS.

WORKMEN'S COMPENSATION and EMPLOYERS' LIABILITY RISKS are also undertaken. For Farmers a very comprehensive Policy is issued at a low rate.

Prospectuses and Full Particulars free on application to the
Chief Office, or to the Scotch Offices—

Aberdeen—41½ Union Street.

ALEX. S. WILSON, District Manager.

Edinburgh—25 Dublin Street.

J. PEARSON CALLUM, C.A., District Manager.

A. WATERS, Managing Director. | R. R. WILSON, Secretary.

This Office is honoured with the Patronage of his Majesty the King.

KEITH & CO.,

ADVERTISING AGENTS,

43 GEORGE STREET, EDINBURGH.

A specialty is made of Estate and Agricultural Advertisements such as Farms, Mansion Houses, &c., to Let, Estates for Sale, Agricultural Shows, &c.; and Messrs Keith & Co. having been appointed

OFFICIAL ADVERTISING AGENTS TO

The Highland and Agricultural Society,

The Scottish Estate Factors' Society,

and other public bodies—Insurance Companies, Law and Estate Agents, Factors, Town Clerks, Clerks to School Boards and other officials, can have every confidence in placing their advertisements in the hands of the Firm.

One Copy of an advertisement is sufficient to send for any number of newspapers, and the convenience of having only one advertising account instead of a number of advertising accounts, is also a great saving of time and trouble.

SERVANTS' REGISTRY DEPARTMENT.

Employers requiring Servants (Male and Female) of all classes
are invited to consult our Registry.

Telegrams—"Promote," Edinburgh. Telephone No. 316.

JOHN SWAN & SONS, LIMITED, LIVE STOCK SALESMEN AND AUCTIONEERS.

FAT STOCK SALES.

HADDINGTON and EAST LINTON on alternate Mondays.
NORTHERN CENTRAL MART, PERTH, every Monday.
SOUTHERN CENTRAL MART, NEWTOWN ST BOSWELLS,
and at EARLSTON, each alternate Monday.
FIFE CENTRAL MART, THORNTON, every Monday.
HAYMARKET, EDINBURGH, every Tuesday.

STORE STOCK SALES.

EDINBURGH CATTLE MARKET every Wednesday.
NORTHERN CENTRAL MART, PERTH, every Friday.

MILCH COWS.

EDINBURGH CATTLE MARKET every Wednesday.

SPECIAL SALES OF STORE CATTLE AND SHEEP at SOUTHERN CENTRAL and FIFE CENTRAL MARTS, and HADDINGTON and EAST LINTON, as arranged.

For dates see daily papers.

*Early notice of Consignments for each Market very desirable.
AMPLE KEEP, AND CAREFUL MEN IN ATTENDANCE.*

Telegrams—"SWANS," Edinburgh, Perth, Thornton, Fife, and Haddington.
Head Office—6 CLIFTON TERRACE, HAYMARKET, EDINBURGH.

EDINBURGH WOOL SALES.

RUSSELL & RAMSDEN, WOOL BROKERS, EDINBURGH,

HOLD Periodic Sales of all sorts of Home-Grown Wools. These Sales are held monthly in summer, and about once in six weeks during the remainder of the year.

RUSSELL & RAMSDEN confine themselves entirely to their business as Wool Brokers, so that Growers will find these Sales a good medium for the disposal of their Clips.

When desired, cash advances are sent on receipt of consignments.



P. & J. HAGGART,

Manufacturers to the King and Queen,

ABERFELDY, N.B.

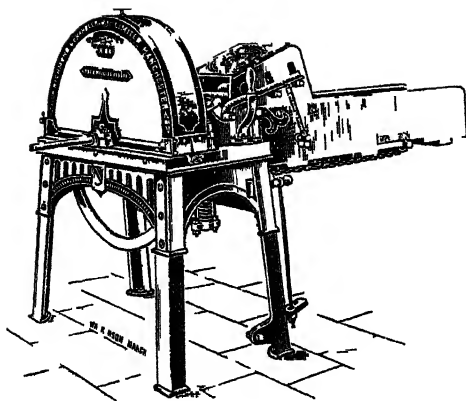
Write for Patterns and Price Lists (post free) of our
"ROYAL SANDRINGHAM TWEEDS"

For Ladies' Dresses and Gentlemen's Suits. Tartans, Rugs, Blankets, Crumb Cloths, &c.

WOOLS RECEIVED FOR MANUFACTURE.

We are the only Manufacturers by Royal Warrant who manufacture the Sandringham Wool into woollens for Their Majesties and Royal Family.

We exhibit yearly at the Highland Shows, and were awarded First Prize for Cheviot Homespuns (over all competitors).



GOLD MEDAL, PARIS, 1900.

SAFETY FEEDER CHAFF CUTTERS

To Comply with the New Act
of Parliament

GREAT COMPETITION at the
Royal Agricultural Society of Eng-
land & Birmingham Show, 1898

Sixteen different Appliances
were Tested at the Trials.

The Judges awarded the **PRIZE** of £10 to Richmond & Chandler, Limited,
for their "Multiplex" Patent Safety Feeder

Since Improved, and numerous other Prizes have been awarded

WEB-FEED ROOT PULPERS, GRATERS, SLICERS, AND FINGER PIECE CUTTERS (BELCHER'S PATENT).

Send for List to

RICHMOND & CHANDLER, LTD., MANCHESTER.



DRIFFIELD'S "PIONEER" DISEASE-RESISTING SWEDE AND "VICTOR" HYBRID TURNIP.

Most Reliable Kinds for Withstanding "Finger and Toe."

Hardy, Nutritious, Heavy Croppers.

Invaluable on all farms liable to this disease.

Evidence—The 'Pioneer' is a distinct improvement on any variety in its resisting power.—W. J. HAYDON Esq., Lynton Devon
The 'Pioneer' and 'Victor' turnips have given the greatest satisfaction
sown alongside other varieties, and under the same conditions. All three show
more of loss 'Finger and Toe'. Yours are free from disease.—J. SMITH, Esq., Orbigny Dublin

'Sown alongside this is resisting' seed from another merchant, the result from your seed
is vastly superior.—Miss COSSA, Dun. Berwickshire

'Your Victor sown alongside another disease resisting turnip (both kinds having a small
dressing of lime, and exactly the same artificiality) with the result that your variety has withstood
'Finger and Toe' in a most remarkable manner and is a good crop the other variety more than
half diseased and a very light crop. I have now no doubt yours are the best and only profitable
kind to grow on badly infested soils.—PETER D. LUKINS, Esq., Dist. Leithian

'Your seeds sent for experiment through Professor Greig (Aberdeen University) have turned
out very satisfactory as compared with other seeds sown in the test. The Pioneer Swede was
sown by the side of fourteen other different kinds of Swedes, and treated exactly the same.
The field was very bad with 'Finger and Toe', it can be imagined from the returns.—The
'Pioneer' produced 17 tons 12 cwt per acre, D—coming second with 1 ton, two others 11 tons,
one 10 tons, three 9 tons, three 8 tons, two 7 tons, and Best of All only 5 tons 5 cwt per acre. The
'Victor' and 'Achilles' were also sown beside five other different kinds of turnips. The 'Victor'
produced 26½ tons, the 'Achilles' 24 tons per acre. The highest return from the other kinds was 17½
tons per acre (Smith's 'Chalklander') and the lowest 5½ tons per acre (Sutton's 'Centenary'). This
test has been carried out with equal fairness to all the different kinds, and I must say that although
the 'Finger and Toe' has been so severe, your seeds have done remarkably well.—From HUGH
M. IVAN Esq., Teunich, Devon

SUPPLIED ONLY IN SEALED BAGS UNDER THE ABOVE TRADE MARK

CROP REPORTS AND PARTICULARS ON APPLICATION.

THOS. N. DRIFFIELD, Brafferton Seed Farms, YORK.

INSURE IN-FOAL MARES, FOALS, AND STALLIONS

WITH THE

**IMPERIAL ACCIDENT, LIVE STOCK, AND GENERAL
INSURANCE COMPANY, LIMITED.**

Incorporated 1878.

Head Office: 17, Pall Mall East, London, W.

"IMPERIAL" offers GREATEST BENEFITS at LOWEST RATES.
All Market Value Insurable.

Insurable until 31st December, or end of Own Month only.

Policy Amount payable for loss of life or limb.

Amount paid for loss of eye, or other member, or limb.

Amount paid for loss of tail, or other member, or limb.

Amount paid for loss of ear, or other member, or limb.

Amount paid for loss of horn, or other member, or limb.

Amount paid for loss of hoof, or other member, or limb.

Amount paid for loss of skin, or other member, or limb.

Amount paid for loss of hair, or other member, or limb.

Amount paid for loss of teeth, or other member, or limb.

Amount paid for loss of claws, or other member, or limb.

Amount paid for loss of hoofs, or other member, or limb.

Amount paid for loss of horns, or other member, or limb.

Amount paid for loss of ears, or other member, or limb.

Amount paid for loss of eyes, or other member, or limb.

Amount paid for loss of nose, or other member, or limb.

Amount paid for loss of mouth, or other member, or limb.

Amount paid for loss of throat, or other member, or limb.

Amount paid for loss of windpipe, or other member, or limb.

Amount paid for loss of lungs, or other member, or limb.

Amount paid for loss of liver, or other member, or limb.

Amount paid for loss of stomach, or other member, or limb.

Amount paid for loss of intestines, or other member, or limb.

Amount paid for loss of bladder, or other member, or limb.

Amount paid for loss of rectum, or other member, or limb.

Amount paid for loss of uterus, or other member, or limb.

Amount paid for loss of vagina, or other member, or limb.

Amount paid for loss of vulva, or other member, or limb.

Amount paid for loss of clitoris, or other member, or limb.

Amount paid for loss of penis, or other member, or limb.

Amount paid for loss of scrotum, or other member, or limb.

Amount paid for loss of testicles, or other member, or limb.

Amount paid for loss of epididymis, or other member, or limb.

Amount paid for loss of vas deferens, or other member, or limb.

For
Water Supply, Drainage,
Driving Farm Machinery.

JOHN S. MOLLAR & SON, ANNAN.

This is the R. A. S. E. Windmill of Wind
Machinery, and is the most
efficient and powerful
in the world.

WHITE, BURNS & CO.,

MANUFACTURERS OF SKINNERS' MACHINERY.

EDINBURGH.

IMPORTANT WORKS

FOR

COUNTRY GENTLEMEN, FARMERS, &c.

STEPHENS' BOOK OF THE FARM. Fourth Edition.

Revised, and in great part Rewritten, by JAMES MACDONALD, F.R.S.E., Secretary of the Highland and Agricultural Society of Scotland. Complete in Six Divisional Volumes, bound in cloth, each 10s. 6d.; or, handsomely bound in Three Volumes, with leather back and gilt top, £3, 8s.

BROWN'S FORESTER. Sixth Edition, Greatly Enlarged.

Edited by JOHN NISBET, D.Cec., Author of 'British Forest Trees and their Sylvicultural Characteristics and Treatment,' &c. In Two Volumes, royal 8vo. With 350 Illustrations, 42s. net. A further Edition of this valuable work is in course of preparation.

RETRIEVERS, AND HOW TO BREAK THEM. By

LIEUT.-COLONEL SIR HENRY SMITH, K.C.B.: *Dedicated by Special Permission to H.R.H. the PRINCE OF WALES.* With an Introduction by S. C. SHIRLEY, President of the Kennel Club. New Edition, Enlarged. With Additional Illustrations. Crown 8vo, 2s.

THE YOUNG ESTATE-MANAGER'S GUIDE. By Rich-

ARD HENDERSON, Member (by Examination) of the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and the Surveyors' Institution. With Plans and Diagrams. Crown 8vo, 5s.

A MANUAL OF AGRICULTURAL BOTANY. From

the German of DR. A. B. FRANK, Professor in the Royal Agricultural College, Berlin. Translated by JOHN W. PATERSON, B.Sc., Ph.D., Free Life Member of the Highland and Agricultural Society of Scotland, and of the Royal Agricultural Society of England. With over 100 Illustrations. Crown 8vo, 3s. 6d.

A TEXT-BOOK OF AGRICULTURAL ZOOLOGY. By

FRED. V. THEOBALD, M.A. (Cantab.), F.E.S., Foreign Member of the Association of Official Economic Entomologists, U.S.A., Zoologist to the S.E. Agricultural College, Wye, &c. With numerous Illustrations. Crown 8vo, 8s. 6d.

THE WILD RABBIT IN A NEW ASPECT; or, Rabbit-

WARRENS THAT PAY. A Record of Recent Experiments conducted on the Estate of the Right Hon. the Earl of Wharfedale at Wortley Hall. By J. SIMPSON, Metallist of the *Société Nationale d'Acclimatation de France*. Second Edition, Revised and Enlarged. Small crown 8vo, 5s.

THE SHOOTER'S DIARY. For Recording the Quantity

OF GAME KILLED, THE TIME AND PLACE, NUMBER OF GUNS, AND NAMES OF PARTIES, &c. With Memoranda of Shooting Occurrences, Engagements, &c. Oblong 8vo, 4s.

JOHNSTON'S ELEMENTS OF AGRICULTURAL CHEM-

ISTRY. From the Edition by SIR CHARLES A. CAMERON, M.D., F.R.C.S.I. Revised and brought down to date by PROFESSOR AIKMAN. Seventeenth Edition. Crown 8vo, 6s. 6d.

JOHNSTON'S CATECHISM OF AGRICULTURAL

CHEMISTRY. From the Edition by SIR CHARLES A. CAMERON, M.D., F.R.C.S.I. Revised and Enlarged by PROFESSOR AIKMAN. Ninety-fifth Thousand. With numerous Illustrations. Crown 8vo, 1s.

WILLIAM BLACKWOOD & SONS, EDINBURGH AND LONDON.

ESTABLISHED 1839.

ENGLISH AND SCOTTISH LAW LIFE ASSURANCE ASSOCIATION.

DIRECTORS IN EDINBURGH.

ANDREW BEATSON BELL, Esq., ADVOCATE, *Chairman.*

G. T. BALFOUR-KINNEAR, Esq., W.S.

CHARLES COOK, Esq., W.S.

ENEAS J. G. MACKAY, Esq., K.C.,
LL.D.

FLETCHER NORTON MENZIES, Esq.

J. A. ROBERTSON-DURHAM, Esq., C.V.

JAMES STEUART, Esq., W.S.

ROBERT STRATHIERN, Esq., W.S.

MANAGER AND SECRETARY.

WALTER A. SMITH, F.F.A.

Assistant Secretary JOHN HOOD.

**Subscribed Capital £1,000,000.
(£930,000 UNCALLED.)**

THIS Association (with Funds of over Two Million Five Hundred Thousand Pounds in hand, securely invested, in addition to the above Subscribed Capital) undertakes every legitimate form of Life Assurance Business. The Advantages it offers comprise—

**Absolute Security. Moderate Premiums.
Equitable Participation in Profits.
Liberal and Simple Policy Conditions.**

NEW COMBINED INVESTMENT AND INSURANCE SCHEME. EXAMPLE OF ADVANTAGES.

A Man, aged 30 next birthday, by an Annual Premium of £36, 10s., limited to Thirty Payments, secures the following alternative BENEFITS on attaining age 60 :—

- (1) A CASH PAYMENT of £1500; or
- (2) An ANNUITY of £138 for Life, or of £178 for Ten Years; or
- (3) An Annuity of £78 for Life, and a Cash Payment of £1000 at Death; or an Annuity of £92 for Ten Years, and a Cash Payment of £1000 at the end of that term; or
- (4) A Fully Paid-up Policy for £2310, payable at subsequent Death.

And, in the event of death before age 60, £1000 at once becomes payable under the Policy.

ATTRACTIVE AND ADVANTAGEOUS SCHEME OF DEFERRED ASSURANCES FOR CHILDREN.

Explanatory Pamphlet on application: "What Others might have done for us."

Guaranteed Five Per Cent Policies: A Safe Provision for Old Age.

LOANS Arranged in connection with LIFE ASSURANCE, on LIFE INTERESTS, REVERSIONS, PERSONAL and other approved SECURITIES.

CHIEF OFFICES:

EDINBURGH: 41 Charlotte Square. LONDON: 12 Waterloo Place.

GLASGOW BRANCH: 105 WEST GEORGE STREET.

Agents in Perth.

THOMAS DEMPSTER, Solicitor.
SKEETH, CHALMERS, & MACKENZIE,
Solicitors.
MILLER & PINKERTON, Solicitors.
ANDREW WEATHERSTONE, Bank of
Scotland.

WILLIAM THORBURN, Solicitor.
MITCHELL & LOGAN, Solicitors.
A. DOUGLAS LAWRIE, Roseneath, Glasgow
Road.
ALEX. STEWART, Solicitor.

AND AT

Aberfeldy—CHARLES MUNRO, Union Bank.
Blairgowrie—W. F. M'ALPINE, Solicitor.
Grieff—MALCOLM FINLAYSON, Solicitor. | STEPHEN G. MICKEL, Solicitor.
Pitlochry—JAMES ROBERTSON, Union Bank.

THE S Ma

It is disting
of nutritious ro
in winning Ac
equally successf
has become a g
Edinburgh in I

FIRST AN

FIRST PR

FIRST PRI

FIRST PR

FIRST PRI

FIRST PRIZE FOR 3 ACRES, 1902,

Stirlingshire (Eastern District) Agricultural Association.

Proved Seed, per lb., 1/-; per Bushel, 45/-

Sutton's Northern King Swede.

We have every confidence in recommending this Swede to our Scotch customers. It is a round purple-topped variety, of excellent shape and quality, and particularly hardy. Proved Seed, per lb., 7d.; per Bushel, 28s.

FOR FULL PARTICULARS SEE

Sutton's Farmers' Year-Book for 1904,

Post Free to Agriculturists on application from

SUTTON & SONS, The King's Seedsmen, READING.